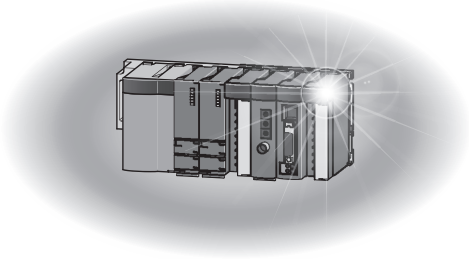
MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC Q series

Q Corresponding Serial Communication Module User's Manual (Basic)

-QJ71C24N
-QJ71C24N-R2
-QJ71C24N-R4
-QJ71C24
-QJ71C24-R2
-GX Configurator-SC (SW2D5C-QSCU-E)



• SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the user's manual of the CPU module to use.
In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠ WARNING

- For the operation status of each station at communication error in each station, refer to the respective manual for each station.
  The communication error may result in an accident due to incorrect output or malfunction.
- When using the notification function, the pager receiver may not be contacted due to the frequency transmission status from the system setup environment and error on the receiver side.
  To ensure the safety of the programmable controller system, install a call circuit with a lamp display or buzzer sound.
- When connecting a peripheral with the CPU module or connecting an external device, such as a personal computer, with an intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely.
  For other forms of control (such as program modification or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding.
  Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure.
  To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

[Design Precautions]

⚠ WARNING

- Do not write any data to the "system area" of the buffer memory in the intelligent function module.
  Also, do not use any "use prohibited" signals as an output signal from the programmable controller CPU to the intelligent function module.
  Doing so may cause malfunction of the programmable controller system.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Keep a distance of 100mm or more between them.
  Failure to do so may result in malfunction due to noise.
- When using the module while values, such as buffer memory set values, are registered in the Flash ROM, do not turn off the power supply for the module loading station nor reset the programmable controller CPU.
  If the power supply for the module loading station is turned off or the programmable controller CPU is reset while any values are registered, the data contents in the Flash ROM become inconsistent and as a result the values must be set again in the buffer memory, etc. and reregistered to the Flash ROM.
  Also, this may cause failure and malfunction of the module.

[Installation Precautions]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing a module.
  Failure to do so may result in damage to the product.
- Do not directly touch any conductive parts and electronic components of the module.
  Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ CAUTION

- When turning on the power and operating the module after installation and wiring are completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Perform correct pressure-displacement, crimp-contact or soldering for external wire connections using the tools specified by the manufactures.
  Incorrect connection may cause short circuits, fire, or malfunction.
- Attach connectors to the module securely.
- Place the cables in a duct or clamp them.
  If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Before connecting the cables, check the type o f interface to be connected.
  Connecting or erroneous wiring to the wrong interface may cause failure to the module and external devices.
- Tighten the terminal screws within the specified torque range.
  Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable.
  For the cable connected to the terminal block, loosen the terminal screw.
  Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.

[Startup/Maintenance Precautions]

⚠ CAUTION

- Do not disassemble or modify the modules.
  Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively.
  Exceeding the limit may cause malfunction.
- Do not touch any terminal while power is on.
  Doing so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws or module fixing screws.
  Failure to do so may cause the module to fail or malfunction.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Operation Precautions]

⚠ CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation.
  Failure to perform correct operations to change data, program, or the status may result in system malfunction, machine damage, or an accident.

[Disposal Precautions]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

• CONDITIONS OF USE FOR THE PRODUCT •

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

REVISIONS

* The manual number is given on the bottom left of the back cover.

Print Date	* Manual Number	Revision
Dec., 1999	SH (NA)-080006-A	First edition
Oct., 2000	SH (NA)-080006-B	Add the contents of the function version B. Correction Contents, Entire manual (change MELSECNET/10H to MELSECNET/H), About Manuals, About The Generic Terms and Abbreviations, Product Configuration, Section 1.2, 1.2(8), 1.3 POINT, Section 2.2, 2.3, 2.5, 2.6, Section 3.1, 3.6, 3.9, Section 4.2, 4.4.1(2)(a)(Figure), 4.6(1), Chapter 5(all), Section 6.1.1, 6.1.3, 6.1.4, Section 7.1.1, 7.1.2, 7.2.2, Section 8.1, 8.2.1, 8.2.2, 8.3.1, 8.3.2, Section 9.2 to 9.7, Section 10.1.1, 10.2.1, 10.3.8, 10.3.18, Appendix 1.1(2), Appendix 2(all), Appendix 3(2), Appendix 7, Appendix 8 Addition Entire manual (add the explanation on MELSECNET/H remote I/O station), The Manual's Use and Structure, Section 2.1, Section 3.1(Table), Section 4.4.2(1)(d), 4.9.2, Section 8.3.2 POINT, Section 10.2.1 (7164H, 7E70H), Appendix 3(1)
Jun., 2001	SH (NA)-080006-C	Put Windows® base software product together from Mitsubishi Programmable Controller MELSEC Series to Mitsubishi integrated FA Software MELSOFT Series. Standardize the name from software package (GPP function) to Product name (GX Developer). Standardize the name from utility package (QSCU) to Product name (GX Configurator-SC). Correction Conformation to the EMC Directive and Low Voltage Instruction, About the Generic Terms and Abbreviations, Product Configuration, Program Examples (Section 6.1.4, 6.2.3, Section 7.2.3, Section 9.3, 9.5, Appendix-8), Section 1.2(1)(d), 1.2(4)(b)(Diagram), 1.2(8)(b), 1.3, Section 2.1, 2.3, 2.4, 2.5, 2.7, Section 3.1(Table), 3.2.1(3), 3.3.3(2), 3.4(Table), 3.9, Section 4.3, 4.5.2, Section 5.1.5(3), 5.2, Section 6.1.4, Section 8.2, 8.3.2 POINT, 8.4.2, 8.4.9(Table), 8.6.3(Table), 8.6.7(Table), Section 10.1.2(b), 10.3(Table), Appendix 1.1, 2.1, 6, 7, 9 Addition Section 2.6, Section 8.4.4, 8.6.2(Table), Section 10.2.1(716FH, 7FEFH), 10.2.3(7FE9H), 10.3.14, Appendix 3
Feb., 2002	SH (NA)-080006-D	Addition About The Generic Terms and Abbreviations, Section 1.2, Section 2.1, 2.7, Section 4.5.2, Section 8.2.1, 8.2.2, Section 10.2.1, Appendix 1.1, 6
Oct., 2002	SH (NA)-080006-E	Addition The Manual's Use and Structure, About The Generic Terms and Abbreviations, Section 1.2(1)(4), Section 2.1, 2.4, Section 5.2, Section 6.1.4, Section 9.8, Appendix 7
Jan., 2003	SH (NA)-080006-F	Addition model QJ71C24N, QJ71C24N-R2, QJ71C24N-R4

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Print Date	* Manual Number	Revision
Jan., 2003	SH (NA)-080006-F	Addition SAFETY PRECAUTIONS, About Manuals, About The Generic Terms and Abbreviations, Product Configuration, Section 1.3, Section 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, Section 3.1, 3.2.1, 3.3.1, 3.6, 3.8, 3.9, Section 4.1, 4.3, 4.4, 4.5, 4.6, 4.7.1, Section 6.1.1, 6.1.2, Section 7.1, 7.2.2, Chapter 8(all), Section 9.1, 9.6, Section 10.1.2(b), 10.1.3(1), 10.2, Appendix 1, Appendix 2.1, Appendix 3, Appendix 5, Appendix 9
Jun., 2004	SH (NA)-080006-G	Correction About The Generic Terms and Abbreviations, Product Configuration, Chapter 2 (all), Section 3.8, Section 4.2.2 (1), Section 5.1.3 POINT, Section 5.1.4, Chapter 8 (screen change), Section 8.6.10, Section 10.1.1, Section 10.2 Addition Appendix 9
Sep., 2004	SH (NA)-080006-H	Correction Section 1.3, Section 2.5, 2.6, Section 3.5, 3.6, 3.9, Section 4.1, Chapter 8 (screen change), Section 8.6.9, 8.6.10, Section 10.1, 10.2, Appendix 1.1 Addition Appendix 9.12
Feb., 2005	SH (NA)-080006-I	Correction Section 2.1 (1), Section 3.1, Section 4.5.2 (1) ©, Chapter 9 (Simultaneous execution of dedicated instructions), Section 10.2.1
Aug., 2005	SH (NA)-080006-J	Correction SAFETY PRECAUTIONS, Section 3.3.1, 3.3.3, Section 8.2.2, Section 9.4, Appendix 5, Appendix 7.1, 7.2
Feb., 2006	SH (NA)-080006-K	Correction Section 2.6, Section 3.9, Section 8.2.1, 8.3.3, Section 9.1, Appendix 5
Mar., 2006	SH (NA)-080006-L	Correction SAFETY PRECAUTIONS, Section 1.3, Section 2.6, Section 3.2.1, 3.8, 3.9, Section 8.6.9, Section 10.2.1, 10.3.11, Appendix 1 Addition Section 10.1.7
Jan., 2008	SH (NA)-080006-M	Change of a term "PLC" was changed to "programmable controller". Correction About The Generic Terms and Abbreviations, Section 1.2, 1.3, Section 2.1, 2.5, 2.7, Section 3.2.1, 3.2.2, 3.3.1, 3.9, Section 4.1, 4.3, 4.4, 4.5.2, 4.6, 4.9.2, Section 5.1.4, 5.2, Section 6.1.6, Chapter 8, Section 9.2 to 9.8, Section 10.1.1, 10.1.6, 10.2.1,10.2.3, 10.3.3, 10.3.4, 10.3.8, 10.3.11, 10.3.19, Appendix 1.1, Appendix 2.1, Appendix 3, Appendix 5, Appendix 7.1 Addition Section 2.5, Appendix 1.3

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Print Date	* Manual Number	Revision
May, 2008	SH (NA)-080006-N	Correction SAFETY PRECAUTIONS, About Manuals, Compliance with the EMC and Low Voltage Directives, About The Generic Terms and Abbreviations, Section 1.2, 1.3, Section 2.1 to 2.3, 2.8, Section 4.1, 4.5.2, Section 5.1.1, Section 8.2.1, 8.3.2, 8.3.3, Section 9.8, Section 10.1.1, 10.2.1, 10.3.3, 10.3.6, Appendices 1.1, 2.1, 3 Addition Section 2.7
June, 2009	SH (NA)-080006-O	Correction About Manuals, Manual's Use and Structure, About The Generic Terms and Abbreviations, Definitions and Descriptions of Terminology, Sections 1.2, 1.3, 2.1, 2.2, 2.4 to 2.6, 2.8, 3.1, 3.2.1, 3.3.4, 3.4 to 3.6, 3.8, 3.9, 4.1 to 4.3, 4.4.2, 4.5.2, 4.5.3, 4.6, 4.7, 4.7.1, 5.1.4, 5.1.5, 6.1.2, 6.1.4, 6.2.2, 7.1.2, and 7.2.2, Chapter 9, Sections 9.1, 9.2.1, 9.2.2, 9.3.1, 9.4, 9.4.5, 9.6.1, 9.6.3, 10.2 to 10.8, 11.1.1, 11.1.2, 11.1.5, 11.1.6, 11.2.1, 11.3, 11.3.1 to 11.3.3, and 11.3.5 to 11.3.22, Appendices 1.1, 2.1, 3, 9.6, and 10 Partial addition Section 3.3.4, Chapter 8, Sections 9.4.9, 9.6.7, 11.3.4, and 11.3.6 Section number change Chapters 8 to 10 → 9 to 11, Sections 9.6.7 to 9.6.10 → 9.6.8 to 9.6.11, Sections 9.4.9 to 9.4.11 → 9.4.10 to 9.4.12, Section 11.3.4 → 11.3.5, Sections 11.3.5 to 11.3.20 →11.3.7 to 11.3.22
Apr., 2011	SH (NA)-080006-P	Correction SAFETY PRECAUTIONS, About The Generic Terms and Abbreviations, Sections 1.2, 1.3, 2.1, 2.2, 2.8, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.8, 4.4, 5.2, 6.1.1, 6.1.3, 9.2.1, 9.2.2, 10.1, 10.4, 11.2.1, 11.3.3, 11.3.8, 11.3.21, Appendices 1.1, 3, 6, 7.1 Addition CONDITIONS OF USE FOR THE PRODUCT, Sections 8.1.5, 8.1.6, 10.7 Section number change Section 10.8 → 10.9
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Print Date	* Manual Number	Revision
Mar., 2015	SH (NA)-080006-R	Correction ABOUT MANUALS, ABOUT THE GENERIC TERMS AND ABBREVIATIONS, DEFINITIONS AND DESCRIPTIONS OF TERMINOLOGY, Sections 1.2, 2.1, 2.8, 3.3.1, 3.3.2, 3.8, 3.9, 4.3, 4.4, 4.4.1, 4.5.2, 4.7, 4.7.1, 6.1.4, Chapters 8, Sections 8.1.6, 9.2.1, 9.2.2, 9.3.3, 10.7, 11.2.1, 11.3.14, Appendices 1.1, 2.3.1, 5, 6.1, 6.2, 9.1, 9.8 Deletion Section 2.7 Section number change Section 2.8 → 2.7

Japanese Manual Version SH-080001-AB

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INTRODUCTION

Thank you for purchasing the MELSEC-Q series programmable controller.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q series programmable controller you have purchased, so as to ensure correct use.
Please forward a copy of this manual to the end user.

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ABOUT MANUALS

The following table lists the manuals relating to this product. Please order the desired manual(s) as needed.

Related manuals

Manual Name	Manual Number (Model Code)
MELSEC-Q/L Serial Communication Module User's Manual (Application) This manual explains the special functions (specifications, usage, and settings) of the serial communication module and data communication method with external devices. (sold separately)	SH-080007 (13JL87)
MELSEC-Q/L MELSEC Communication Protocol Reference Manual This manual explains how the external devices read and write programmable controller CPU data through communication with the MC protocol using the serial communication module/Ethernet module. (sold separately)	SH-080008 (13JF89)
GX Configurator-SC Version 2 Operating Manual (Protocol FB support function) This manual explains the function and usage of the protocol FB support function that supports the creation of the data communication program of the serial communication module and set up of each parameter. (sold separately)	SH-080393E (13JU46)
GX Configurator-SC Version 2 Operating Manual (Pre-defined protocol support function) This manual explains the pre-defined protocol support function and usage, and the protocol setting method. (sold separately)	SH-080850ENG (13JU66)

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- Safety Guidelines
  (This manual is included with the CPU module or base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

No additional measures are necessary for the compliance of this product with EMC and Low Voltage Directives.

● How to use this manual

In this manual, details of the serial communication modules (QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24 and QJ71C24-R2) are organized as shown below, according to their applications.
Please use this manual using the contents below as a reference.

(1) To learn about features, functions and component parts

(a) To learn about features and functions
- Chapter 1 describes the features of the serial communication modules.
- Chapter 3 describes the common specifications and functions of the serial communication modules.

(b) To learn about the packed items and system-configured items
- The section prior to Chapter 1, "Product Configuration", describes the parts that are packed along with the serial communication module.
- Parts and components other than those packed with the module must be prepared separately by the user.

(2) To learn about processing required to start up the serial communication module

(a) To learn about the startup procedure
- Section 4.2 describes the general procedures prior to starting the operation of the serial communication module.

(b) To learn about the connection with the external devices
- Section 4.4 describes the connection methods for each type of interface.

(c) To learn about processing required prior to operation of the serial communication module
- Section 4.5 explains the parameter settings with GX Developer in order to use the serial communication module.
- Section 4.6 and Chapter 9 describe the settings from GX Configurator-SC to perform the initial setting of the serial communication module.
  To change an initial value, follow the procedure described in Chapter 9.

(d) To check for failure in the serial communication module
- Section 4.7 describes the test of the individual serial communication module.

(e) To learn how to check for a connection error with the external devices
- Section 4.8 describes how to perform the individual module test and the loopback test using MC protocol-based communication.

＊ Details of the loopback test command are described in the reference manual.

(3) To learn about data communication functions and detailed explanations

(a) To learn about the communication functions
- Section 3.4 describes an overview of the serial communication module functions.

(b) To learn about detailed explanations of the communication functions
- The basic communication methods are described in Chapters 5 to 7.
- Special functions are described in the User's Manual (Application).

(4) To learn about data communication functions and programming

(a) To learn how to read data from and written to the programmable controller CPU
- Data is read from and written to the programmable controller CPU with a communication function using the MC protocol.

＊ Details are described in the Reference Manual.
- Appendix 7 describes an overview of the communication support tool (MX Component) that supports communication using the MC protocol.

(b) To learn how to send and receive data between the programmable controller CPU and the external devices
- Data communication between the programmable controller CPU and the external devices is performed with a communication function using the non procedure protocol or the bidirectional protocol.
- Chapter 6 explains details of the communication functions and programming using the non procedure protocol.
- Chapter 7 explains details of the communication functions and programming using the bidirectional protocol.

(c) To learn how to transfer data between a programmable controller CPU and an external device using the protocol of the external device
- With the pre-defined protocol function, data can be transferred between the QJ71C24N(-R2/R4) and external devices.

＊ The details are described in the Operating Manual (Pre-defined protocol support function).

(5) To learn how to check for error occurrences and take corrective actions

Chapter 11 describes troubleshooting, how to check for errors, and detailed explanations of error codes.

(6) To learn about functions that have been added or changed in function version B

- Section 1.3 lists the functions that have been added or changed as well as manuals that provide detailed explanations hereof.
- Appendix 1.1 provides a breakdown of the functions of Q series C24/GX Configurator-SC by function version/software version.

- The structure of this manual

  The module's buffer memory stores default values that are used as initial settings to execute the data send/receive functions in order to communicate with the external devices.
  Data can be sent to or received from the external devices using these default values. However, it may be necessary to change the default values, depending on system specifications.
  This manual explains how to perform the initial settings in order to use each function of the utility package available for this module (GX-Configurator-SC).
  When changing a default value for sending and receiving data to/from an opposite device, first see the section describing the applicable function to verify the initial setting item and setting value you wish to change, then change the default value as explained in Chapter 9.

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ABOUT THE GENERIC TERMS AND ABBREVIATIONS

This manual uses the following generic terms and abbreviations to describe the serial communication modules, unless otherwise specified.

(1) Generic terms and abbreviations of relevant modules

In this manual, the following generic terms and abbreviations are used to indicate the programmable controller CPU and other modules used for the data-communication functions of the serial communication modules. Module model names are provided when relevant model names are needed to be shown.

Generic term/abbreviation	Description of generic term/abbreviation	
Q series C24 (C24)	The abbreviation for QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24 and QJ71C24-R2 type serial communication modules (Indicated as "C24" in the diagrams)	
QC24	A generic term for AJ71QC24, AJ71QC24-R2, AJ71QC24-R4, A1SJ71QC24, and A1SJ71QC24-R2	
QC24N	A generic term for AJ71QC24N, AJ71QC24N-R2, AJ71QC24N-R4, A1SJ71QC24N1, A1SJ71QC24N1-R2, A1SJ71QC24N, and A1SJ71QC24N-R2	
QC24(N)	A generic term for QC24, and QC24N	
QCPU	A generic term for the Basic model QCPU, High Performance model QCPU, Process CPU, Redundant CPU, and Universal model QCPU	
Basic model QCPU	A generic term for Q00JCPU, Q00CPU, and Q01CPU	
High Performance model QCPU	A generic term for Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, and Q25HCPU	
Process CPU	A generic term for Q02PHCPU, Q06PHCPU, Q12PHCPU, and Q25PHCPU	
Redundant CPU	A generic term for Q12PRHCPU, and Q25PRHCPU	
Universal model QCPU	A generic term for the Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q03UDVCPU, Q03UDECPU, Q04UDHCPU, Q04UDVCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDVCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDVCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDVCPU, Q26UDEHCPU, Q50UDEHCPU, and Q100UDEHCPU	
Built-in Ethernet port QCPU	A generic term for the Q03UDVCPU, Q03UDECPU, Q04UDVCPU, Q04UDEHCPU, Q06UDVCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDVCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDVCPU, Q26UDEHCPU, Q50UDEHCPU, and Q100UDEHCPU	
QCPU station	The abbreviation for the programmable controller with QCPU installed	
QnACPU	A generic term for Q2ACPU, Q2ACPU-S1, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q3ACPU, Q4ACPU, and Q4ARCPU	
Q/QnACPU	A generic term for QCPU, and QnACPU	
UC24 Computer link module	A generic term for AJ71UC24, A1SJ71UC24-R2, A1SJ71UC24-R4, A1SJ71UC24-PRF, A1SJ71C24-R2, A1SJ71C24-R4, A1SJ71C24-PRF, A2CCPUC24, and A2CCPUC24-PRF ＊ A series computer link modules.	
Serial communication module	A generic term for the module below	
	QnA series	AJ71QC24, AJ71QC24-R2, AJ71QC24-R4, A1SJ71QC24, A1SJ71QC24-R2, AJ71QC24N, AJ71QC24N-R2, AJ71QC24N-R4, A1SJ71QC24N1, A1SJ71QC24N1-R2, A1SJ71QC24N, A1SJ71QC24N-R2.
	Q series	QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24, QJ71C24-R2.
C Controller module	A generic term for the C Controller modules: Q06CCPU-V, Q06CCPU-V-B, Q12DCCPU-V, Q24DHCCPU-V, and Q24DHCCPU-LS	

(2) Other generic terms and abbreviations

This manual uses the following generic terms and abbreviations to explain the data-communication devices for the serial communication module. The names/model names are provided when it is necessary to explicitly identify the model being discussed.

Generic term/abbreviation	Description of generic term/abbreviation
BIDIN	The abbreviation for G.BIDIN or GP.BIDIN
BIDOUT	The abbreviation for G.BIDOUT or GP.BIDOUT
Buffer memory	A generic term for memory of the intelligent function modules/special function modules used for storing data sent to or received from the programmable controller CPU. (setting values, monitor values, etc.)
BUFRCVS	The abbreviation for Z.BUFRCVS
Computer	A generic term for one of the external devices with which data can be sent/received using the MC protocol or the bidirectional protocol
CPRTCL	The abbreviation for G.CPRTCL or GP.CPRTCL
CSET	The abbreviation for ZP.CSET
Data communication function	A generic term for MC protocol, non procedure protocol, and bidirectional protocol, and pre-defined protocol
GETE	The abbreviation for G.GETE or GP.GETE
GX Configurator-SC	The abbreviation for GX Configurator-SC (SW0D5C-QSCU-E or later) • Initial settings for the module, monitoring and testing can be performed without using a sequence program and without considering I/O signals or buffer memory. (Intelligent function utility) • Converting sequence programs necessary for data communication processing into function blocks (FB) can shorten program production man-hours. In addition, the monitoring and analysis of the transmitted/received data by the communication network can shorten the system start-up time. (Protocol FB support function) • Since the protocol required for communication with each external device (thermal regulator, barcode reader, etc.) can be set easily, the steps for creating transmission control programs appropriate to the external device can be reduced. Also, the volume of the programs written to a programmable controller CPU can be reduced because protocol setting data are written to a flash ROM. The debugging support function allows monitoring and analysis of communication data on the network, enabling a shorter system startup time. (Pre-defined protocol support function)
GX Developer	The product name of the software package for the MELSEC programmable controllers
GX Works2	
I/F	The abbreviation for interface
INPUT	The abbreviation for G.INPUT
Intelligent function module devices	A generic term for buffer memory of the intelligent function modules used for storing data sent to or received from the programmable controller CPU. (setting values, monitor values, etc.)
Intelligent function modules	A generic term for the Q series programmable controller modules that are operated by commands from the programmable controller CPU (equivalent to the A series programmable controller special function modules) Examples: • CC-Link interface module • A/D and D/A conversion modules • Ethernet interface module • Serial communication module
MELSECNET/10	The abbreviation for MELSECNET/10 network system
MELSECNET/H	The abbreviation for MELSECNET/H network system
MX Component	The abbreviation for MX Component (SW0D5C-ACT-E or later)
ONDEMAND	The abbreviation for G.ONDEMAND or GP.ONDEMAND
Operating Manual (Protocol FB support function)	GX Configurator-SC Version 2 Operating Manual (Protocol FB support function)
Operating Manual (Pre-defined protocol support function)	GX Configurator-SC Version 2 Operating Manual (Pre-defined protocol support function)

Generic term/abbreviation	Description of generic term/abbreviation
Opposite devices (external devices)	A generic term for computers, indicators, measuring instruments, ID modules, bar code readers, regulators, other serial communication modules, UC24, etc. that are connected to this serial communication module for data communication
OUTPUT	The abbreviation for G.OUTPUT or GP.OUTPUT
PRR	The abbreviation for G.PRR or GP.PRR
PUTE	The abbreviation for G.PUTE or GP.PUTE
Reference Manual	Q Corresponding MELSEC Communication Protocol Reference Manual
RS-232 (interface)	The abbreviation for interface conforming to RS-232
RS-422/485 (interface)	The abbreviation for interface conforming to RS-422 and RS-485
SPBUSY	The abbreviation for G.SPBUSY or GP.SPBUSY
Special function modules	A generic term for the A/QnA series programmable controller modules that are operated by commands from the programmable controller CPU (equivalent to the Q series programmable controller intelligent function modules) Examples: • CC-Link interface module • A/D and D/A conversion modules • High-speed counter module • Ethernet interface module • Computer link module and serial communication module
Switch setting	A generic term for intelligent function module switch setting
UINI	The abbreviation for ZP.UINI
User's Manual (Application) or Application	MELSEC-Q/L Serial Communication Module User's Manual (Application)
User's Manual (Basic) or Basic	Q Corresponding Serial Communication Module User's Manual (Basic)
Windows® 7	A generic term for Microsoft® Windows® 7 Starter operating system, Microsoft® Windows® 7 Home Premium operating system, Microsoft® Windows® 7 Professional operating system, Microsoft® Windows® 7 Ultimate operating system, and Microsoft® Windows® 7 Enterprise operating system Note that the 32-bit version is specified as "32-bit Windows® 7", and the 64-bit version is specified as "64-bit Windows® 7".
Windows Vista®	A generic term for Microsoft® Windows Vista® Home Basic operating system, Microsoft® Windows Vista® Home Premium operating system, Microsoft® Windows Vista® Business operating system, Microsoft® Windows Vista® Ultimate operating system, and Microsoft® Windows Vista® Enterprise operating system
Windows® XP	A generic term for Microsoft® Windows® XP Professional operating system, and Microsoft® Windows® XP Home Edition operating system

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DEFINITIONS AND DESCRIPTIONS OF TERMINOLOGY

The following table lists the definitions and descriptions of terminology used in this manual and related manuals for the Q series serial communication modules.

Terms	Description
A compatible IC frame (Formats 1 to 4)	One of the message formats for the serial communication module for performing communication using the MC protocol and ASCII code data. This is the same message format as when communicating using the protocol for the A series computer link modules. Device memory read/write operations for the QCPU are allowed within the device range of the AnACPU. For details, see the Reference Manual.
Bidirectional protocol	A communication procedure for the serial communication modules and one of the data communication functions for communicating any data between the programmable controller CPU and an opposite device. Details are explained in Chapter 7.
Independent operation	A mode of interface operation to communicate data with external devices using a function specified in each communication protocol setting. Two interfaces of serial communication modules do not interact.
Linked operation	The operation mode of each of the two interfaces for a serial communication module that are connected to external devices and linked to one another in order to send/receive data to/from the external devices. The two interfaces communicate data using the identical data-communication function (MC protocol (identical format) or non procedure protocol) and the identical transmission specifications. (Linked operation using the bidirectional or pre-defined protocol is not allowed.)
MELSEC communication protocol (MC protocol)	A communication procedure for the Q series serial communication modules or the Ethernet interface modules, and a name of communication method for accessing to the programmable controller CPU from an opposite device. (This is called the MC protocol in this manual.) There are two communication methods; one uses ASCII code data and the other uses binary code data. Details are explained in the Reference Manual.
Message send function (Printer function)	This function registers character data (messages) to be sent to external devices (mainly printers) in the serial communication module as a user frame in advance, and sends the registered data for multiple user frames using the non-procedure protocol (sent by an instruction from the programmable controller CPU).
Multidrop connection	A name of the connection when multiple external devices or other serial communication modules are connected in a 1:n or m:n mode using the serial communication module's RS-422/485 interface.
Non procedure protocol	A user's communication procedure and one of the data communication functions for communicating any data between the programmable controller CPU and an opposite device. Details are explained in Chapter 6.
Packet	A string of data used for communication with external devices by the pre-defined protocol.
Pre-defined protocol	One of the data communication functions available for the QJ71C24N(-R2/R4). In data communication between the QJ71C24N(-R2/R4) and an external device, data can be sent and received by using a protocol for the external device. This must be set in GX Configurator-SC (Pre-defined protocol support function). The details are described in Chapter 8 and the Operating Manual (Pre-defined protocol support function).
Pre-defined protocol support function	A function available in GX Configurator-SC (Pre-defined protocol support function), which includes: • Registration of the protocol appropriate to each external device • Writing protocol setting data to or reading them from the flash ROM of the QJ71C24N(-R2/R4) • Debug support function The details are described in Chapter 8 and the Operating Manual (Pre-defined protocol support function).

Terms	Description
QnA compatible 2C frame (Formats 1 to 4)	One of the message formats for the serial communication module for performing communication using the MC protocol and ASCII code data. This is the same message format as the communication frame using the protocol for the QnA series serial communication modules. • QnA compatible 2C frame (Formats 1 to 4): QnA simplified frame (Formats 1 to 4) Details are explained in the Reference Manual.
QnA compatible 3C frame (Formats 1 to 4) QnA compatible 4C frame (Formats 1 to 4)	One of the message formats for the serial communication module for performing communication using the MC protocol and ASCII code data. This is the same message format as the communication frame using the protocol for the QnA series serial communication modules. • QnA compatible 3C frame (Formats 1 to 4): QnA frame (Formats 1 to 4) • QnA compatible 4C frame (Formats 1 to 4): QnA extension frame (Formats 1 to 4) Details are explained in the Reference Manual.
QnA compatible 4C frame (Format 5)	One of the message formats for the serial communication module for performing communication using the MC protocol and binary code data. This is the same message format as the communication frame using the protocol for the QnA series serial communication modules. • QnA compatible 4C frame (Format 5): QnA extension frame (Format 5) Details are explained in the Reference Manual.
User frame	Data name when the fixed format portion of messages to be sent or received between a serial communication module and an opposite device is registered in the module and used for sending and receiving data with the functions listed below. (The contents of a user frame data should conform to the specifications of the opposite device). The data array of the head and tail sections of a message (transmission control code, C24 station number, sum check, fixed data, etc.) to be sent and received is registered in the serial communication module before use. • MC protocol on-demand function. • Data communication function using the non procedure protocol. Details are explained in the User's Manual (Applications).

PRODUCT CONFIGURATION

The following lists the product configuration of the Q series serial communication modules.

Model	Item name	Quantity
QJ71C24N or QJ71C24	QJ71C24N serial communication module or QJ71C24 serial communication module	1
	Terminal resistor 330Ω ¼W (for RS-422 communication)	2
	Terminal resistor 110Ω ½W (for RS-485 communication)	2
QJ71C24N-R2 or QJ71C24-R2	QJ71C24N-R2 serial communication module or QJ71C24-R2 serial communication module	1
QJ71C24N-R4	QJ71C24N-R4 serial communication module	1
	RS-422/485 plug-in connector socket block	2
	Terminal resistor 330Ω ¼W (for RS-422 communication)	4
	Terminal resistor 110Ω ½W (for RS-485 communication)	4
	Plate terminal (for connecting a braided shield cable)	4
SW2D5C-QSCU-E	GX Configurator-SC Version 2 (1-license product) (CD-ROM)	1
SW2D5C-QSCU-EA	GX Configurator-SC Version 2 (Multiple-license product) (CD-ROM)	1

MEMO

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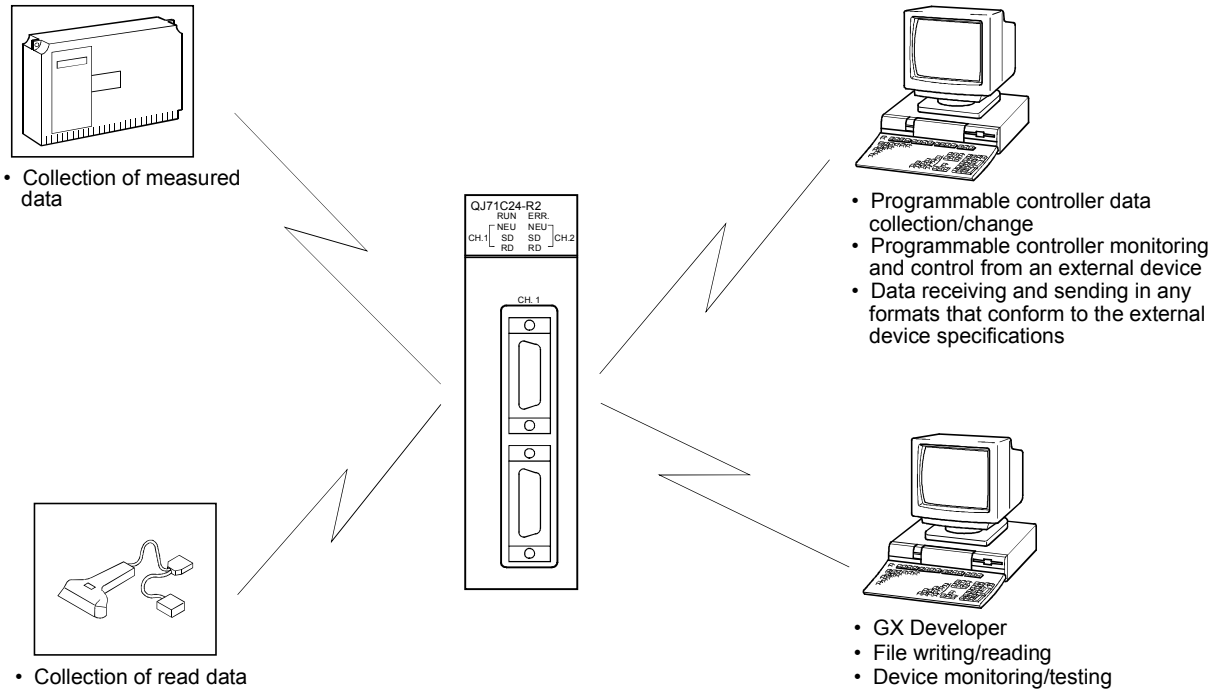
1 OVERVIEW

This manual describes the specifications for the QJ71C24N, QJ71C24N-R2, QJ71C24N-R4, QJ71C24, QJ71C24-R2 serial communication module (hereinafter referred to as "Q series C24"), as well as the procedures prior to starting the operation, maintenance, inspection, data communication methods for use with external devices and troubleshooting.
When applying the following program examples to the actual system, make sure to examine the applicability and confirm that it will not cause system control problems.

1.1 Overview of the Serial Communication Module

The Q series C24 is a module that connects the Q series programmable controller CPU and an external device using an RS-232 or RS-422/485 line for serial communication, in order to achieve the data communication described below.
By using a modem/terminal adapter, a public line (analog/digital) can be used for data communication with a remote location.

- Programmable controller data collection/change from the external devices (See the MELSEC Communication Protocol Reference Manual.)
- Programmable controller monitoring and control from the external devices (See the User's Manual (Application).)
- Data receiving and sending in any formats that conform to the external device specifications (See Section 1.2. (2), (3), and (4).)
- Collection of measured data from a measuring device (See Section 1.2. (2) and (4).)
- Operation of a programmable controller CPU that is connected to a personal computer installed with GX Developer. (See the GX Developer Manual.)



* Being a convenient means of connection among different devices (personal computers, display devices, printers, etc.), the serial communication line is the most widely used medium on the market today.

1.2 Features of the Serial Communication Module

The following describes the features of the Q series C24.

(1) Data communication based on the MELSEC communication protocol (hereinafter referred to as the MC protocol)

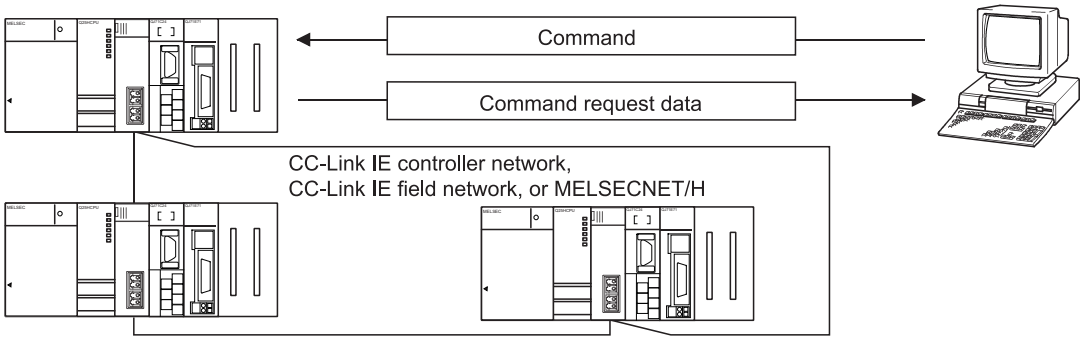
(Details are explained in the MELSEC Communication Protocol Reference Manual.)

(a) External devices can read/write the programmable controller device data and sequence programs, and can monitor programmable controller equipment status.
With the exception of the on-demand function described below, the programmable controller does not require a sequence program because the programmable controller sends and receives data based solely on commands from external devices.

(b) Using the on-demand function, data can be sent from the programmable controller CPU to the external devices in each frame format of the MC protocol.

(c) Data communication can be performed using a program at the external device side that has been created for communicating data with conventional A/QnA series computer link module/serial communication modules.

(d) When an external device is a personal computer, use separately sold communication support tools (MX Component). This allows a communication program for the external device to be created, regardless of MC protocol's transmitting/receiving procedure.
For details on MX Component, refer to Appendix 7 and the operating manual of MX Component.



* In the MELSECNET/H (MELSECNET/10 mode), other stations (including the A/QnA series programmable controller CPUs) can be accessed during data link operation.
* The MC protocol is equivalent to the communication function using a dedicated protocol that is supported by the A/QnA series computer link module/serial communication modules.

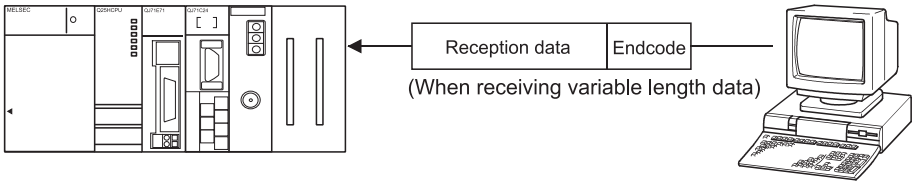
(2) Data communication using the non procedure protocol

(Details are explained in Chapter 6 and the User's Manual (Application).)

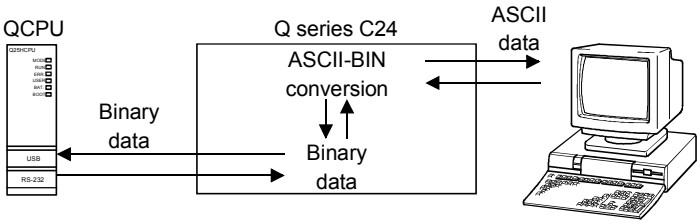
(a) Data can be transferred in any message formats that conform to the specifications of external devices (measuring devices, personal computers, etc.).

(b) Fixed or variable length messages can be received in accordance with the external device specifications.

- How to receive the variable length data
  The external device sends data by adding at the end of the message the end-code data (CR+LF or any one-byte data) that is set for the Q series C24.
- How to receive the fixed length data
  The external device sends the amount of data equivalent to the size of the end data that is set for the Q series C24.



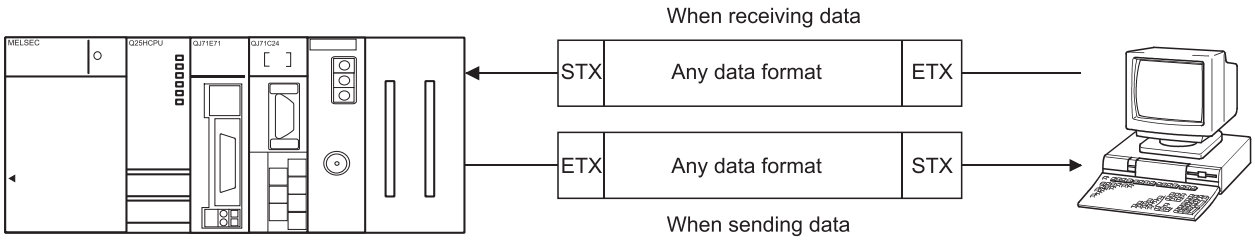
(c) ASCII code data can be used for communication using the ASCII-BIN conversion function.



(d) It is necessary to create a sequence program for communication control that is appropriate to the external device.

(e) Communication can be performed using a user frame by registering the fixed format portion of the head and tail sections of a message as a user frame.

- When sending data, the Q series C24 adds a user frame to any data specified by the user.
- When receiving data, the Q series C24 transfers any data excluding the user frame to the programmable controller CPU.



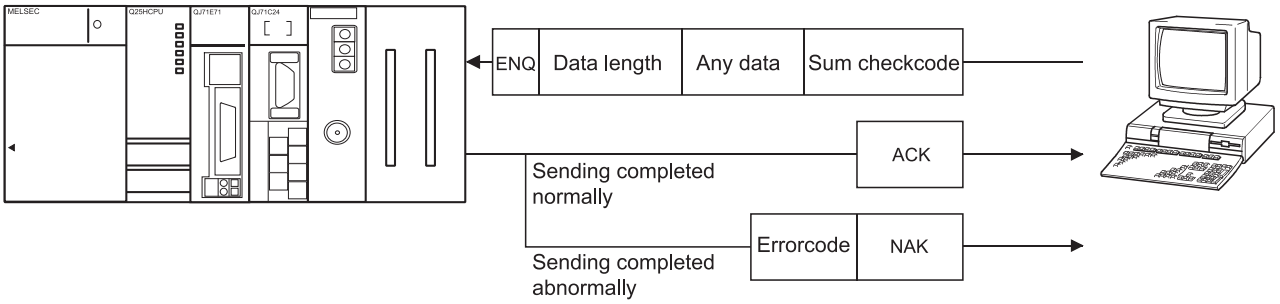
(f) It is possible to clear the current reception data without interrupting the transmission processing by using the dedicated instruction "CSET".

(3) Data communication using the bidirectional protocol

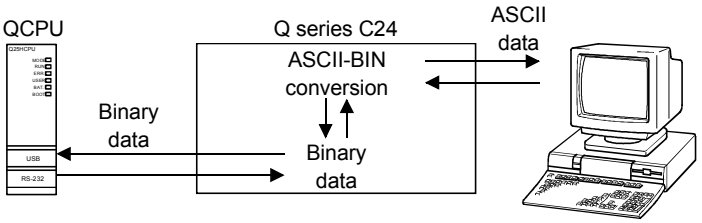
(Details are explained in Chapter 7 and the User's Manual (Application).)

(a) In communication between programmable controller CPUs and communication with an external device for which transmission/receive control programming is allowed, data communication is performed in a sequence of "data transmission and response receipt".

(b) Error check of received data can be performed using the sum-check code, while the occurrence of a reception error at an external device can be checked via an ACK/NAK response.



(c) ASCII code data can be used for communication using the ASCII-BIN conversion function.



(4) Data communication using the pre-defined protocol

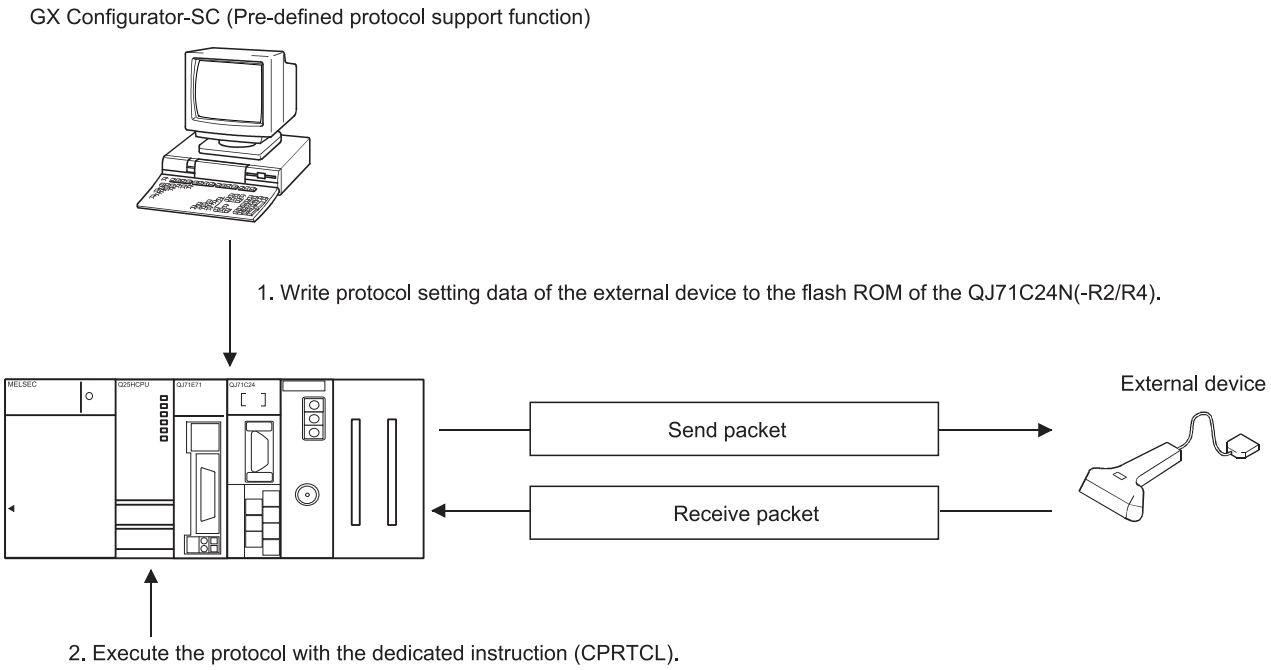
(Details: Chapter 8, the Operating Manual (Pre-defined protocol support function))

(a) Data can be transferred by using a protocol for the external device.
GX Configurator-SC (Pre-defined protocol support function) allows simple protocol setting required for communication with the external device (thermal regulator, barcode reader, etc.)
A protocol can be selected from the pre-defined protocol library, or newly created and edited.
Communication control programs appropriate to the target device, such as programs for creating send packets and analyzing receive packets, can be eliminated. This can reduce the steps for creating programs.

(b) Writing registered protocol setting data to the flash ROM reduces the volume of the program to be written the programmable controller CPU.

The following is the procedure for the pre-defined protocol communication.

1) Use GX Configurator-SC (Pre-defined protocol support function) to select or create/edit the protocol of the external device. Then write the protocol setting data to the flash ROM of the QJ71C24N(-R2/R4).
2) With a dedicated instruction (CPRTCL), execute the protocol written to the flash ROM.


GX Configurator-SC (Pre-defined protocol support function)
1. Write protocol setting data of the external device to the flash ROM of the QJ71C24N(-R2/R4).
External device
Send packet
Receive packet
2. Execute the protocol with the dedicated instruction (CPRTCL).

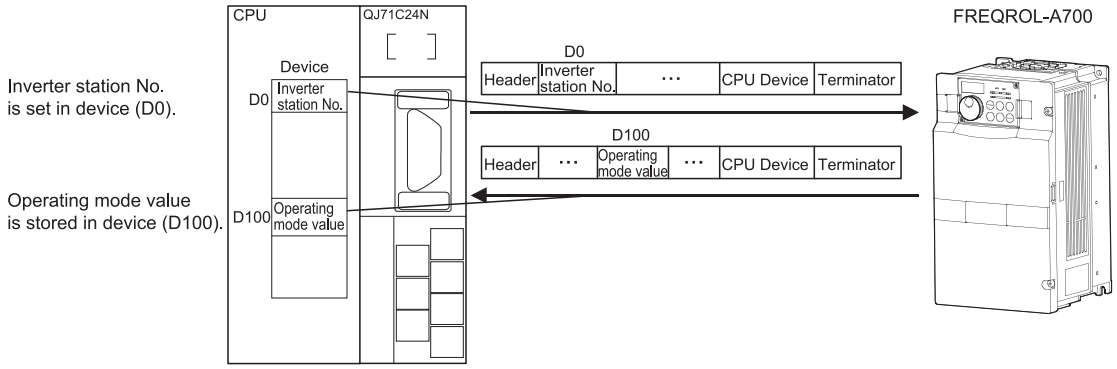
(c) Use of the dedicated instruction (CPRTCL) allows a continuous execution of up to eight protocols.

(d) By specifying transmission and reception data storage areas, device or buffer memory data can be set in communication packets.

- For sending
  The user can set a variable system-dependent element, such as a channel number, in the specified device or buffer memory.
  The QJ71C24N(-R2/R4) automatically places the value in the user-specified device or buffer memory into the appropriate position of the send packet before sending the packet.
- For receiving
  The QJ71C24N(-R2/R4) automatically stores only the necessary data, such as readout values, in the user-specified device or buffer memory.

The following is an example.

- System example
  The QJ71C24N(-R2/R4) is connected to an inverter and reads the operating mode value from the inverter.
  A packet with the inverter station No. set in device (D0) is sent, and an operating mode value is stored in device (D100).



(e) With the debugging support function of GX Configurator-SC (Pre-defined protocol support function), programs for communications between the QJ71C24N(-R2/R4) and external device can be debugged.
- In the Protocol execution log window, the protocol name, start and end dates and times, and result of each execution can be monitored.
- The circuit trace function allows tracing of send/receive packet data and the signal line status.
- By the State monitor, the error status and signal lines of the QJ71C24N(-R2/R4) can be monitored.

(5) Monitoring the programmable controller CPU

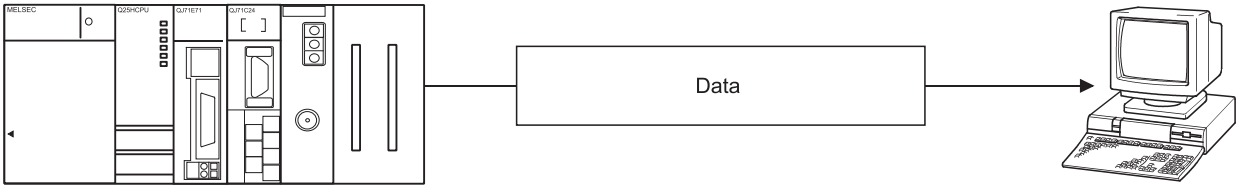
(Details are explained in the User's Manual (Application).)

(a) The self-station's programmable controller CPU can be monitored at time intervals set by the user without using a sequence program.

1) The following monitoring information can be sent/notified as the result of monitoring the programmable controller CPU.
   - Transmission of information on devices and the programmable controller CPU status to be monitored. (It is also possible to send the monitoring information through combined use of the modem function.)
   - Notification of a notification message (string data) registered as the connection data of the modem function, through combined use of the modem function.

2) The user can select either one of the following timing choices at which to send the programmable controller CPU monitoring result to the external device.
   - Send/notify every time the programmable controller CPU is monitored (periodic transmission).
   - Send/notify when the information read from the programmable controller CPU matches the conditions set by the user (conditional transmission).

(b) The programmable controller CPU monitoring function can be used in communication using the MC or non procedure protocol.



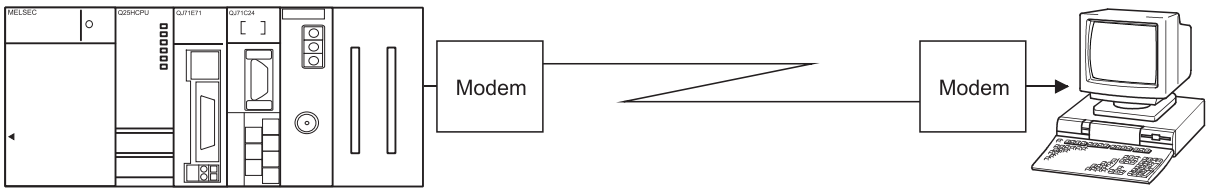
(6) Remote communications using the modem function

(Details are explained in the User's Manual (Application).)

(a) Data communication can be performed with a remotely located external device.

(b) Modem initialization and line connection/disconnection can be performed.

(c) Data communication can be performed using the MC, non procedure or bidirectional protocol.



(7) Initial settings and communication settings without using a sequence program

Various initial settings can be performed using GX Configurator-SC (SW0D5C-QSCU-E or later).

(8) Connecting GX Developer and the GOT

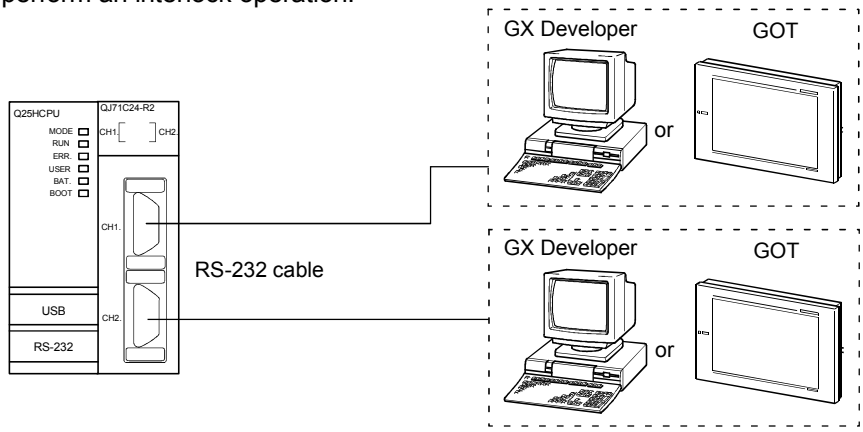
(a) Connecting GX Developer (Details are explained in the GX Developer Operating Manual.)

- By connecting a personal computer installed with GX Developer to the interface of the Q series C24 at the same time, operations such as programming, monitoring and testing for the programmable controller CPU can be performed.
- By connecting multiple personal computers installed with GX Developer to the programmable controller CPU or Q-series C24 at the same time, operations such as programming and monitoring can be performed simultaneously by multiple operators.
  Operating GX Developers using these simultaneous connections can improve program performance.

(b) Connecting the GOT (Details are explained in the GOT User's Manual (Connection).)

By connecting a GOT (graphic operation terminal) to the interface for the Q series C24 operations such as monitoring the programmable controller CPU can be performed.

(c) Simultaneous connection of GX Developer and GOT
- It is possible to connect a personal computer with GX Developer and the GOT to two interfaces of the Q series C24 at the same time. It is thus possible for more than one user to perform programming, monitoring, etc. simultaneously.
  GX Developer cannot be connected to CH1 on the QJ71C24N, CH2 on the QJ71C24, and the QJ71C24N-R4.
- When the GOT and the personal computer with GX Developer are connected at the same time, the two interfaces of the Q series C24 cannot perform an interlock operation.



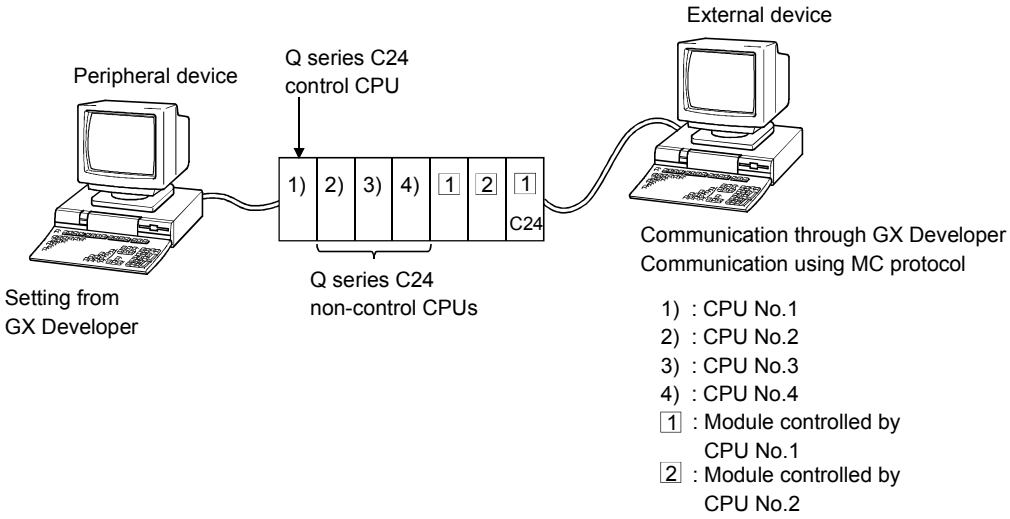
POINT

- When GX Developer or a GOT is connected to the Q series C24 on a 1:1 (one-to-one) basis:
  The switch setting for the interface connected to GX Developer or a GOT is not required for accessing or monitoring a QCPU. (If the switch setting is not performed, the GX Developer connection mode will be active.)
- When GX Developer or a GOT is connected to the Q series C24 on a 1:n (multi-drop) basis:
  Refer to the GX Developer Operating Manual.

(9) Functions supporting multiple CPU systems (Details are explained in the Reference Manual.)

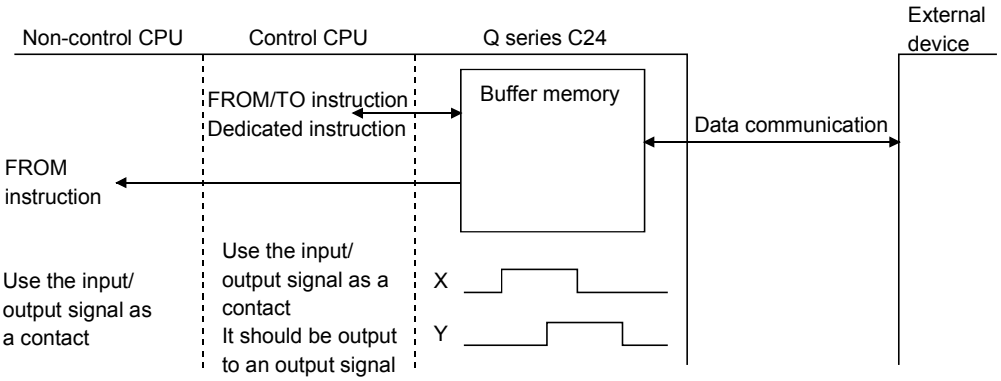
(a) When accessing QCPUs in a multiple CPU system using the MC protocol or through GX Developer, it is possible to perform data communication such as reading/writing device data by specifying the QCPU to be accessed.

- When using the Q series C24 in a multiple CPU system, a QCPU controlling the Q series C24 (hereinafter abbreviated as the control CPU) should be specified using GX Developer.
  It is also possible to mount a Q series C24 of function version A in a multiple CPU system and access to the only control CPU (CPU No.1).

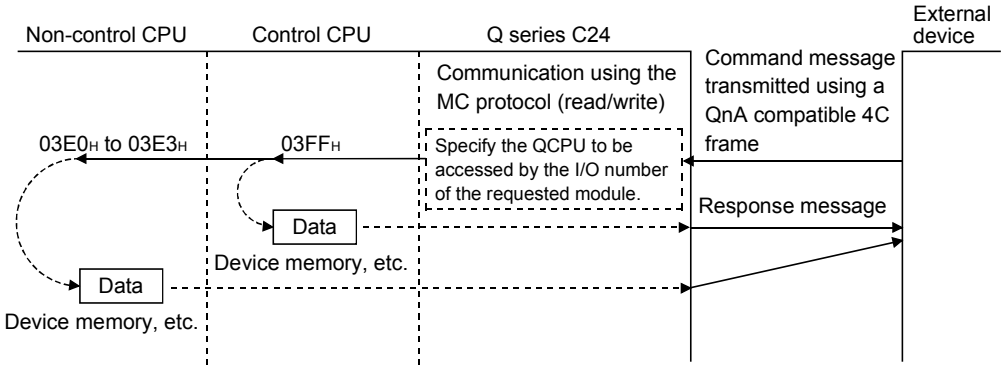


(b) When a Q series C24 CPU of function version B is used in a multiple CPU system, the following forms of data communication can be performed with the Q series C24.

1) It is possible to perform data communication using the non procedure/bidirectional protocols from the control CPU
2) It is possible to read the buffer memory from non-control CPUs. Input/output signals can be used as contacts.

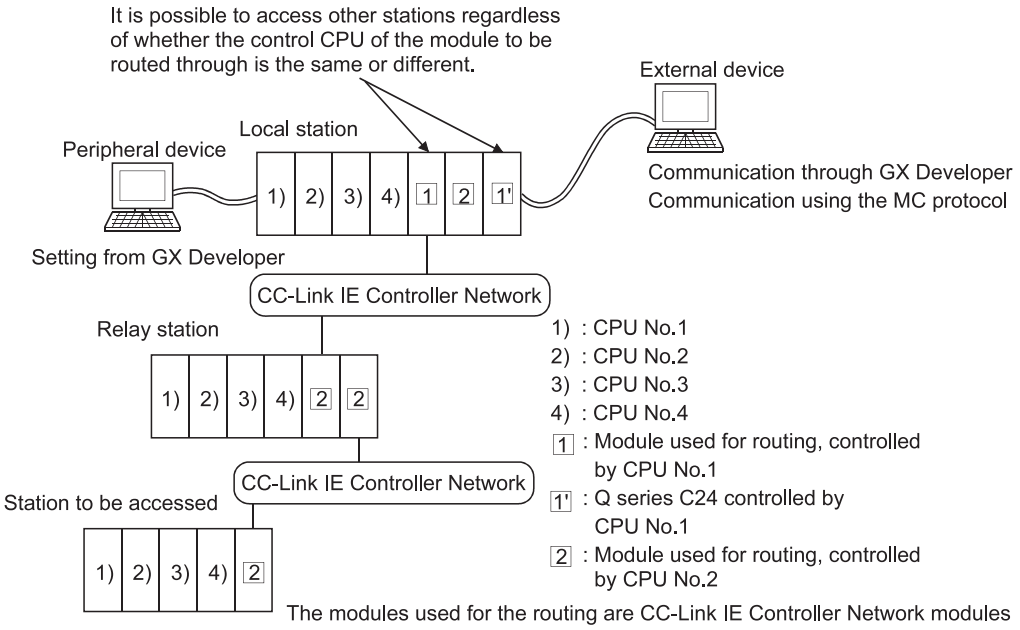


3) It is possible to access the control CPU and non-control CPUs using the MC protocol and through GX Developer from the external device.
In addition, data communication with the control CPU of the Q series C24 can be performed using the non procedure/bidirectional protocol.
(Example) When communicating with the MC protocol



If the MC protocol, GX Developer is used to access other stations, it is possible to access the control CPU and non-control CPUs of the station to be accessed even if the relay station and the accessed station are multiple CPU systems.

(Example)


It is possible to access other stations regardless of whether the control CPU of the module to be routed through is the same or different.
External device
Local station
Peripheral device
1) 2) 3) 4) 1 2 1'
Communication through GX Developer
Communication using the MC protocol
Setting from GX Developer
CC-Link IE Controller Network
Relay station
1) 2) 3) 4) 2 2
CC-Link IE Controller Network
Station to be accessed
1) 2) 3) 4) 2
1) : CPU No.1
2) : CPU No.2
3) : CPU No.3
4) : CPU No.4
1 : Module used for routing, controlled by CPU No.1
1' : Q series C24 controlled by CPU No.1
2 : Module used for routing, controlled by CPU No.2
The modules used for the routing are CC-Link IE Controller Network modules

* The QnA compatible 4C frame should be performed for access to non-control CPUs when communicating using the MC protocol.
However, the available functions differ depending on the QCPU to be accessed (whether it is a control CPU or a non-control CPU).
See the Reference Manual for the available functions and accessible range.

* A module used for routing can access the following modules when accessing other stations:
  - CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 network module
  - Q series C24 • Ethernet interface module

* If there is a module of function version A among the modules for routing, it is possible to access the control CPU of that particular module only. In addition, it is possible to access other stations via a module controlled by the same control CPU.

(10) Remote password check function

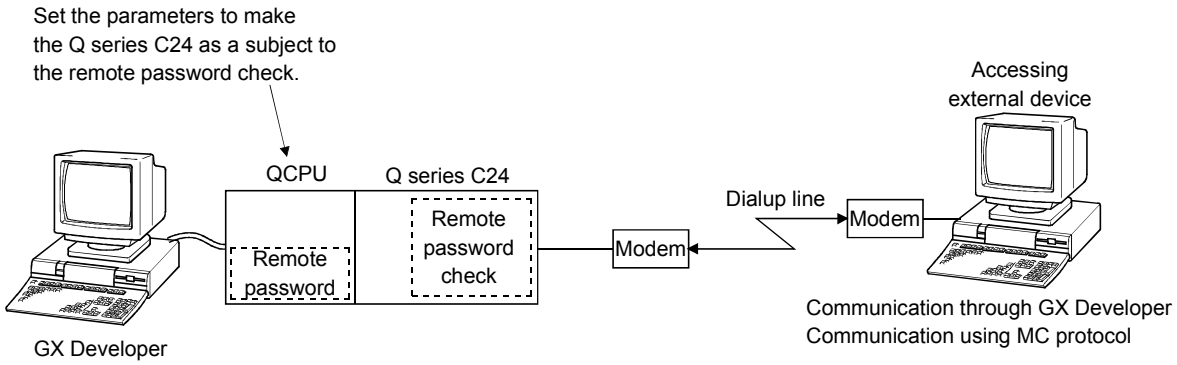
(Details are explained in the User's Manual (Application) and the Reference Manual.)

(a) The remote password check function of the Q series C24 prevents users at a remote location to access QCPUs illegally using the modem function of the Q series C24.
(The remote password is checked in the following forms of data communication)
- Communication using the MC protocol
  (The remote password check is not carried out in data communication using the non procedure/bidirectional protocols.)
- Access to the programmable controller through GX Developer

＊ The remote password function is one of the QCPU functions and used for preventing illegal access to the QCPU by other users.
Use GX Developer to set a remote password for the QCPU in order to activate the remote password function of the QCPU.

(b) If the Q series C24 is specified in the parameters of a QCPU as being subject to the remote password check, the remote password can be unlocked (canceled) using either one of the methods below, to allow data communication from the external device. It is necessary to connect a line to the modem first.
- When communicating using the MC protocol
  Use the dedicated command for communication using the MC protocol to unlock the remote password from the external device.
- When accessing the programmable controller through GX Developer
  Unlock the remote password using GX Developer at the start of online operation.

The remote password is automatically locked by disconnecting the line to the modem.



1.3 About Added/Changed Functions in Function Version B

The table below lists the functions that have been added or changed in the Q series C24 of function version B.

POINT

(1) The added/changed functions shown in this section includes the functions added in the first products of function version B or later.
For the function version, serial No., and software version of the Q series C24 and related products (CPU module, GX Developer, and GX Configurator-SC) that can use the added/changed functions, refer to Section 2.7.

(2) See Appendix 1.1 concerning a comparison of functions in the different Q series C24 function versions.

Function	Outline of function	Supported module		Supported protocol				Reference section
		QJ71C24N (-R2/R4)	QJ71C24 (-R2)	MC	Non procedure	Bi-directional	Pre-defined	
Simultaneous connection of GX Developer and GOT	This function allows access to the programmable controller from a personal computer with GX Developer and a GOT connected to two different interfaces of the Q series C24 at the same time.	○ ＊1	○ ＊2	×	×	×	×	Section 1.2
Control of RS(RTS) and ER(DTR) signal states	This function allows the control of the on or off state of the RS(RTS) and ER(DTR) signals with the programmable controller program.	○	×	○	○	○	○	Section 3.2.1, REMARKS
Support for 230, 400 bps	This function allows data communication with an external device at a transmission speed of 230, 400 bps.	○	×	○	○	○	○	Chapter 4
Data transmission/reception at low speed	This function allows data communication with an external device at a transmission speed of 50 bps.	○	○	○	○	○	○	
Clearing reception data by a dedicated instruction	This function allows clearing reception data using the CSET instruction during data communication using the non procedure protocol. It is possible to clear the data even when data is being transmitted.	○	○	×	○	×	×	Chapter 6, Section 10.9
Programmable controller CPU information clear	This function clears the programmable controller CPU information of the Q series C24. (The programmable controller CPU information is information about the access target CPU type used in MC protocol communications.)	○	×	○	×	×	×	Section 11.1.7
Transmission of the programmable controller CPU monitoring information through combined use of the modem function	When the programmable controller CPU monitoring function is active, this function sends the monitoring information of the programmable controller CPU to the external device through the modem.	○	○	○	○	×	×	User's Manual (Application)
Automatic initialization for modem	Initializes the modem automatically when Q series C24 starts up.	○	○	○	○	○	×	User's Manual (Application)
Callback	After line connection from the GX Developer, access to the QCPU from the GX Developer is made possible through line reconnection from the Q series C24 (callback). Transmission costs after line connection from the Q series C24 side are borne by the Q series C24 side.	○	○	×	×	×	×	

＊1 GX Developer cannot be connected to CH2 on the QJ71C24N and the QJ71C24N-R4.
＊2 GX Developer cannot be connected to CH2 on the QJ71C24.

Function	Outline of function	Supported module		Supported protocol				Reference section
		QJ71C24N (-R2/R4)	QJ71C24 (-R2)	MC	Non procedure	Bi-directional	Pre-defined	
Remote password check	This function allows data communication after the external device completes the unlock processing of the remote password set at a QCPU. It is executed when the QCPU is accessed from a remote location using the modem function of the Q series C24 in the following forms of data communication: • Communication using the MC protocol • Communication using GX Developer	○	○	○	×	×	×	User's Manual (Application) Reference Manual
Addition of non reception monitoring time format in non procedure protocol	This function allows messages to be received in the non reception protocol by time-out in non reception monitoring time (timer 0) if the received complete code and received data count have been not determined.	○	×	×	○	×	×	User's Manual (Application)
Transmission control start/end free area designation	This function allows the designation of the available capacity of the OS area that notifies the data reception failure at the time of transmission control (DTR/DSR signal control and DC code control).	○	×	○	○	○	○	User's Manual (Application)
Addition of changeable data to the user frame (05H, 0BH, 11H, 17H)	These functions allow the following codes to be registered as the changeable data of user frames for data communication. • Horizontal parity code • Sum check code of two's-complement number	○	○	○	○	×	×	User's Manual (Application)
Addition of changeable data to the user frame (04H, 0AH, E5H, EBH)		○	×					
Adding a reception function through the use of user frames	This function allows reception of a message consisting of the head frame and any data field when receiving data by specifying the head frame. The data length of the data field can be specified freely for each combination of user frames for reception set by the user. (Receiving 1 byte providing ACK/NAK only is also possible by setting the data length of the data field to "0.")	○	○	×	○	×	×	User's Manual (Application)
Multiple specification of transparent codes for transmission	This function allows specification of a maximum of 10 types of transparent codes for transmission per interface when sending data using one of the following protocols: • Non procedure protocol • Bidirectional protocol	○	○	×	○	○	×	User's Manual (Application)
Switching to the GX Developer connection mode by switching the mode	This function allows the GX Developer connection mode to be switched by an external device or the programmable controller CPU.	○	×	○	○	○	○	User's Manual (Application) Reference Manual
Communication data monitoring function	This function allows the monitoring of communication data transmitted on the communication network of the Q series C24 and an external device.	○	×	○	○	○	○	User's Manual (Application) Operating Manual (Protocol FB support function)
UINI instruction	The UINI instruction allows change of the mode, transmission specifications and host station No. of the Q series C24.	○	×	○	○	○	○	User's Manual (Application)
Specification of station No.65 to 120 by MC protocol (QnA compatible 4C/3C frame only)	This function allows to access station No. 65 to 120 of CC-Link IE Controller Network and CC-Link IE Field Network.	○	×	○	×	×	×	Reference Manual

Function	Outline of function	Supported module		Supported protocol				Reference section
		QJ71C24N (-R2/R4)	QJ71C24 (-R2)	MC	Non procedure	Bi-directional	Pre-defined	
Access to link direct device LW10000 or higher using MC protocol (QnA compatible 4C/3C frame only)	This function allows access to link direct device LW10000 or higher.	○	×	○	×	×	×	Reference Manual
Access to extended data register D65536 or higher or extended link register W10000 or higher using MC protocol (QnA compatible 4C/3C/2C frame only)	This function allows access to extended data register D65536 or higher and extended link register W10000 or higher.	○	×	○	×	×	×	Reference Manual
Support for multiple CPU system	This function allows access to the control/non-control CPUs specified by the user when performing the following forms of data communication with a multiple CPU system: • Communication using the MC protocol • QCPU access from GX Developer	○	○	○	×	×	×	Reference Manual
Data communication using the pre-defined protocol function	Data can be transferred with the protocol appropriate to the communication target device.	○	×	×	×	×	○	Chapter 8, Operating Manual (Predefined protocol support function)

2 SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

This Chapter explains the system configuration and available functions.

2.1 Applicable Systems

This section describes the applicable systems.

(1) Applicable modules and base units, and No. of modules

(a) When mounted with a CPU module

For the CPU modules, the number of modules, and base units applicable to the C24, refer to the user's manual for the CPU module used.

Note the following when the C24 is used with a CPU module.

- Use the QJ71C24N (-R2/R4) with a serial number (first five digits) of "10042" and the function version B or later, when the QJ71C24N (-R2/R4) is used with the Universal model QCPU.
- Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient.
  Pay attention to the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.
- Mount a module within the number of I/O points for the CPU module. If the number of slots is within the available range, the module can be mounted on any slot.

REMARKS

When using the Q series C24 with a C Controller module, refer to the user's manual for the C Controller module.

(b) Mounting to a MELSECNET/H remote I/O station
For the MELSECNET/H remote I/O station, the number of modules, and base units applicable to the C24, refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) Support of the multiple CPU system

When using the Q series C24 in a multiple CPU system, refer to the QCPU User's Manual (Multiple CPU System) first.

(3) Supported software packages

(a) Software/setting & monitor tools (＊1) for the programmable controller
Relation between the system containing the Q series C24 and software package is shown in the following table.
To use the Q series C24, GX Developer or GX Works2 is required.

		Software version		
		GX Developer	GX Configurator-SC	GX Works2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.10L or later (Versions prior to SW0D5C-QSCU-E 40E are not usable.)	Refer to the GX Works2 Version 1 Operating Manual (Common).
	Multiple CPU system	Version 8 or later		
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single CPU system	Version 4 or later	SW0D5C-QSCU-E 00A or later	
	Multiple CPU system	Version 6 or later	SW0D5C-QSCU-E 20C or later	
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	Version 1.13P or later (Versions prior to SW0D5C-QSCU-E 40E are not usable.)	
	Multiple CPU system			
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later		
	Multiple CPU system			
Q12PRH/Q25PRHCPU	Redundant system	Version 8.45X or later	Version 1.14Q or later	
Q00UJ/Q00U/Q01UCPU	Single CPU system	Version 8.76E or later	Version 2.17T or later	
	Multiple CPU system			
Q02U/Q03UD/Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later	Version 2.12N or later	
	Multiple CPU system			
Q10UDH/Q20UDHCPU	Single CPU system	Version 8.76E or later	Version 2.17T or later	
	Multiple CPU system			
Q13UDH/Q26UDHCPU	Single CPU system	Version 8.62Q or later	Version 2.12N or later	
	Multiple CPU system			
Q03UDE/Q04UDEH/ Q06UDEH/Q13UDEH/ Q26UDEHCPU	Single CPU system	Version 8.68W or later	Version 2.17T or later	
	Multiple CPU system			
Q10UDEH/Q20UDEHCPU	Single CPU system	Version 8.76E or later	Version 2.17T or later	
	Multiple CPU system			
CPU modules other than the above	Single CPU system	Not supported	Not supported	
	Multiple CPU system			
When installing an MELSECNET/H remote I/O station		Version 6 or later	SW0D5C-QSCU-E 30D or later	

＊1 For versions of a software package that support the new functions of the Q series C24, refer to Section 2.7.

(b) Communication support tools for external devices

Item Name	Model	Remark
MX Component	SWnD5C-ACT -E	ActiveX control library. The "n" in the model name is 0 or greater. (＊1)

＊1 Depending on the version of MX Component used, different versions of Q series C24 are supported.
See the manual of MX Component for the details.

POINT

When using GX Works2, refer to the following:
- GX Works2 Version 1 Operating Manual (Common)
- GX Works2 Version 1 Operating Manual (Intelligent Function Module)

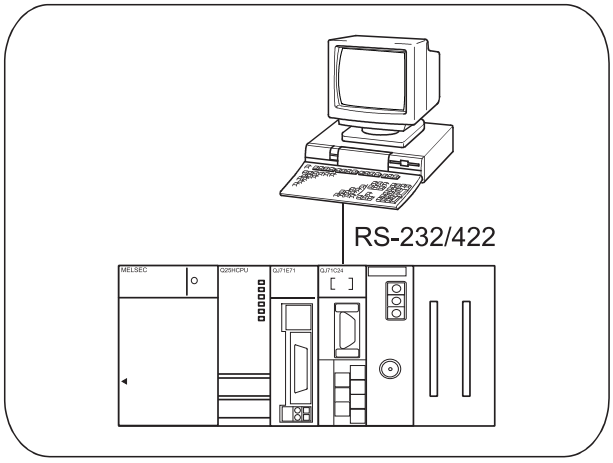
2.2 Combinations of Programmable Controller CPU and External Device, and Available Functions

The following describes the system configurations and available functions when using the Q series C24.

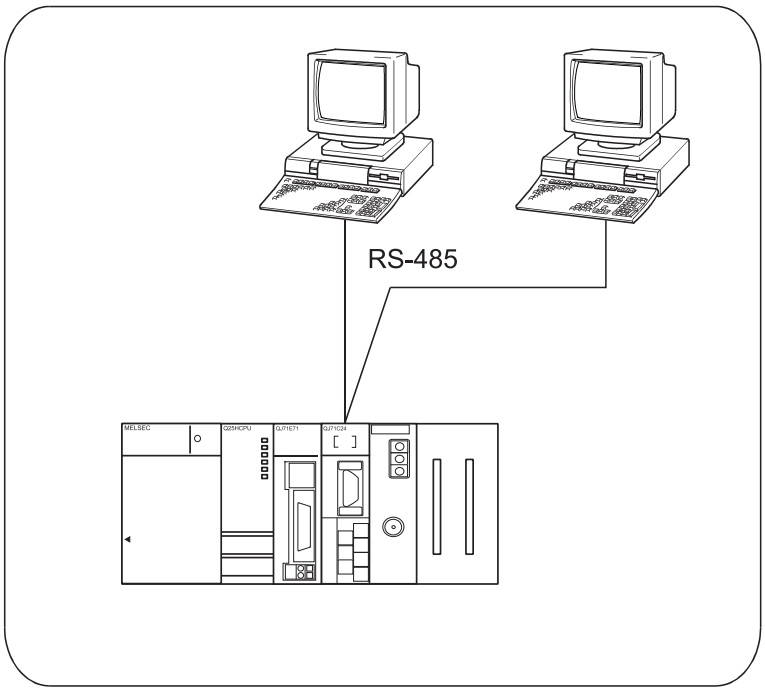
(1) System configurations

System configurations (combinations of programmable controller CPU and external device) for data communication are shown below.

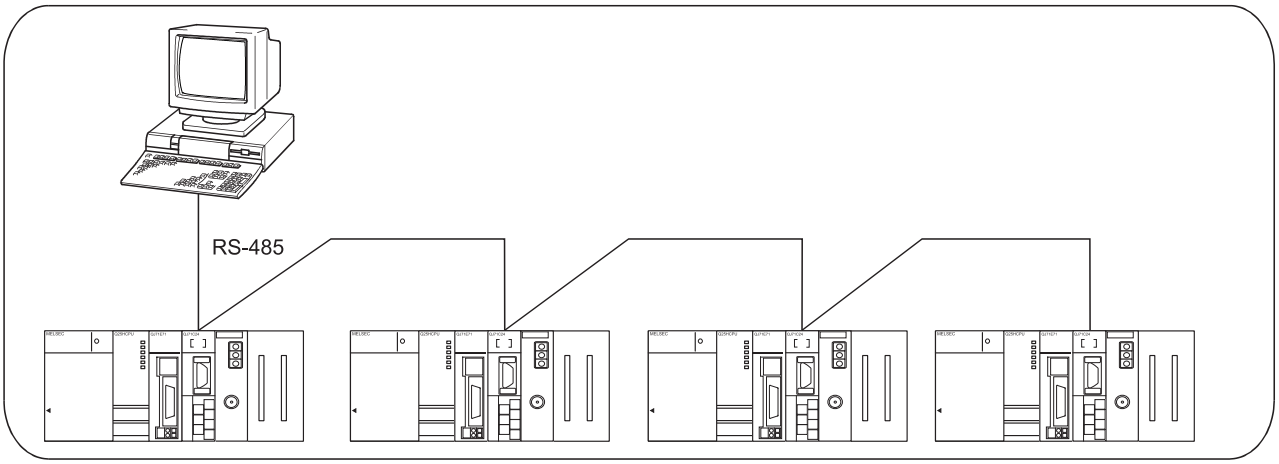
(a) External device and Q series C24 with 1:1 system configuration

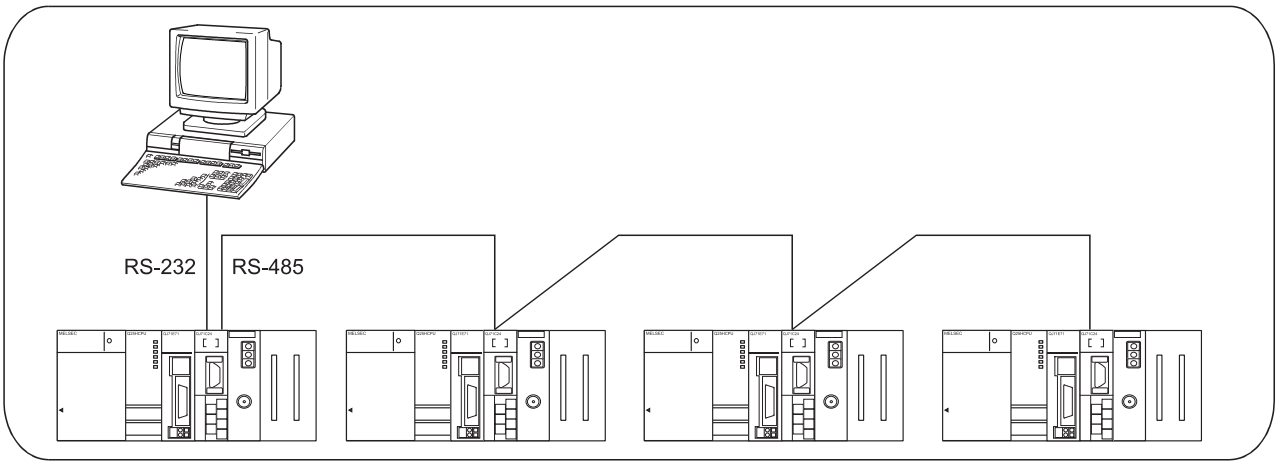


(b) External device and Q series C24 with n:1 system configuration

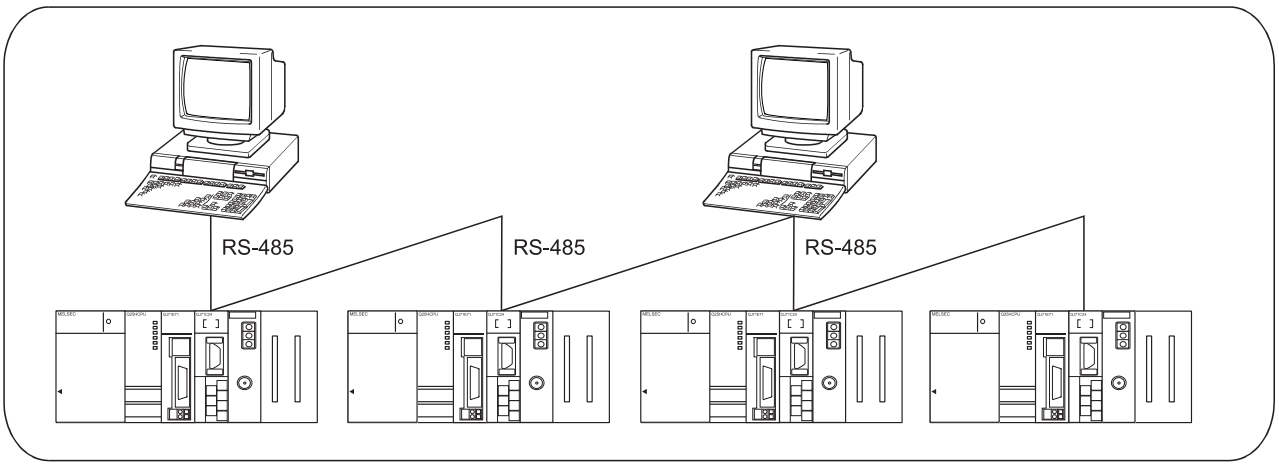


(c) External device and Q series C24 with 1:n system configuration





(d) External device and Q series C24 with m:n system configuration



(2) Correspondence between the data communication functions and system configurations

The following shows system configurations that can use the data communication functions of the Q series C24.

The words in the reference section column in the table below represent the following manuals:

- Application
  MELSEC-Q/L Serial Communication Module User's Manual (Application)
- Reference
  MELSEC-Q/L MELSEC Communication Protocol Reference Manual
- Operating
  GX Configurator-SC Version2 Operating Manual (Pre-defined protocol support function)

(a) Communication using the MC protocol (○ : Available, × : Not available)

Function	System configuration				Reference section
	1 : 1	n : 1	1 : n	m : n	
Programmable controller CPU device memory read/write	○	○	○	○	Reference
Intelligent function module buffer memory read/write	○	○	○	○	
Sequence program read/write	○	○	○	○	
Programmable controller CPU status control (remote RUN, STOP, etc.)	○	○	○	○	
On-demand function	○	×	×	×	Reference Application
Global function	○	○	○	○	Reference
Accessing the programmable controller of other stations in the CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10, Ethernet	○	○	○	○	
Programmable controller CPU monitoring function	○	×	×	×	Application

(b) Communication using the non procedure protocol

(○ : Available, × : Not available)

Function	System configuration				Reference section
	1 : 1	n : 1	1 : n	m : n	
Data transmission/receiving in arbitrary format	○	○	○	○	Chapter 6
Data transmission/receiving with user frames	○	○	○	○	Application
Programmable controller CPU monitoring function	○	×	×	×	
Reading received data using interrupt programs	○	○	○	○	
Sending/receiving ASCII data using ASCII-BIN conversion	○	○	○	○	

(c) Communication using the bidirectional protocol

(○ : Available , × : Not available)

Function	System configuration				Reference section
	1 : 1	n : 1	1 : n	m : n	
Data transmission/receiving	○	×	×	×	Chapter 7
Reading received data using interrupt programs	○	×	×	×	Application
Sending/receiving ASCII data using ASCII-BIN conversion	○	×	×	×	

(d) Communication using the pre-defined protocol

(○ : Available , × : Not available)

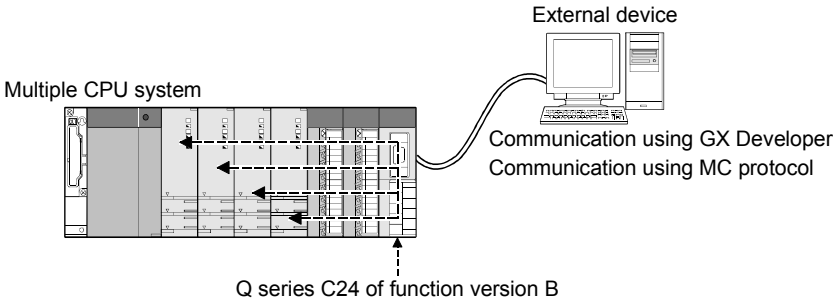
Function	System configuration				Reference section
	1 : 1	n : 1	1 : n	m : n	
Data transmission/reception	○	○	×	×	Chapter 8 Operating

* In general, if data communication is performed using a system configuration of other than 1:1 connection mode, the following points should be well noted.
  - Avoid simultaneous transmission.
  - Discard data received other than that addressed to the local station.

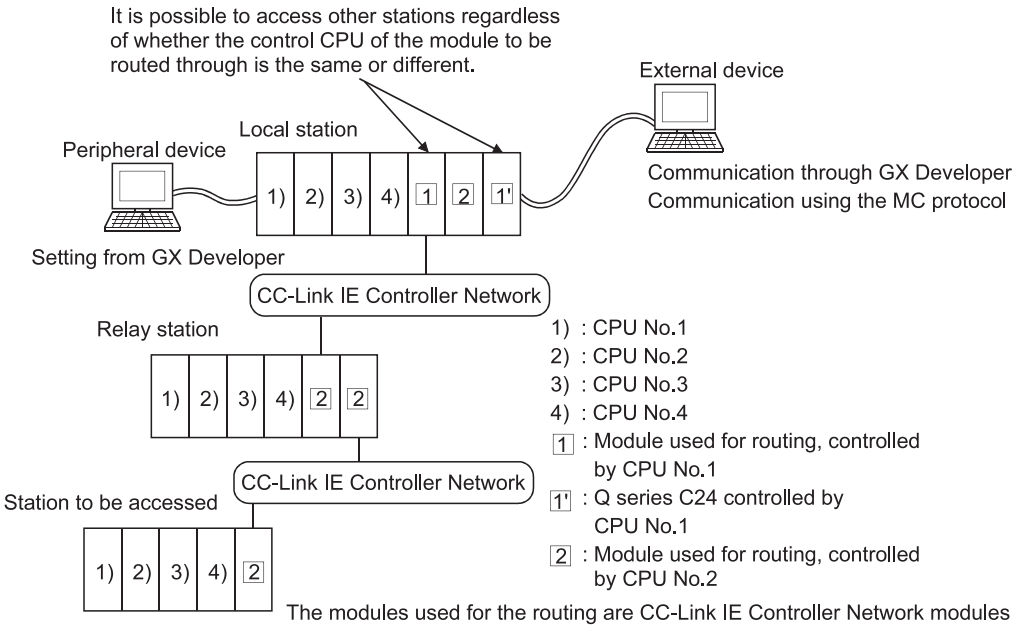
2.3 For Use in Multiple CPU System

This section explains the use of the Q series C24 in a multiple CPU system.

(1) When making access from the external device to the non-control CPU of the Q series C24 using either of the following functions, use the Q series C24 of function version B.
When the Q series C24 of function version A is used, only the control CPU can be accessed. (Access to the non-control CPU will result in an error.)
- Communication using MC protocol
- Communication using GX Developer


External device
Multiple CPU system
Communication using GX Developer
Communication using MC protocol
Q series C24 of function version B

(2) If the other stations to be accessed belong to the multiple CPU system, the modules used for routing and QCPUs at the local station, all the relay stations, and the accessed station should be modules of function version B or later. This has to hold in all cases of accessing the non-control CPU of the module used for routing and the accessed station.*1
(Example)


It is possible to access other stations regardless of whether the control CPU of the module to be routed through is the same or different.
External device
Local station
Peripheral device
1) 2) 3) 4) 1 2 1'
Communication through GX Developer
Communication using the MC protocol
Setting from GX Developer
CC-Link IE Controller Network
Relay station
1) 2) 3) 4) 2 2
CC-Link IE Controller Network
Station to be accessed
1) 2) 3) 4) 2
1) : CPU No.1
2) : CPU No.2
3) : CPU No.3
4) : CPU No.4
1 : Module used for routing, controlled by CPU No.1
1' : Q series C24 controlled by CPU No.1
2 : Module used for routing, controlled by CPU No.2
The modules used for the routing are CC-Link IE Controller Network modules

*1 When accessing other stations, a module used for routing can access the following modules:
- CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 network modules
- Q series C24
- Ethernet interface modules

2.4 Use with Basic Model QCPU

This section describes the use of the Q series C24 with a Basic model QCPU.

(1) Available functions

The following table lists the functions that can be used when the Q series C24 is mounted with a Basic model QCPU.

Function		Availability
Communications using the MC protocol (＊1)		○
Communications using non procedure protocol		○
	Data reception by interrupt program	○ (＊2)
Communications using the bidirectional protocol		○
	Data reception by interrupt program	○ (＊2)
Communications using the pre-defined protocol		○
Communications using dedicated instructions		○
Communications via public line, etc. (modem function)		○
	Remote password check	○ (＊2)
Transmission Control	DC code control (including Xon/Xoff control)	○
	DTR/DSR control	○
Communications protocol switching		○
Independent/linked operation of each interface		○
Initial setting and monitoring/testing of setting values by the utility package		○
Connecting the GX Developer and GOT		○

○ : Available × : Not available

＊1 Communications are according to the MC protocol. See the Reference Manual concerning the number of devices that can be accessed and the processing time.
The range of devices that can be accessed differs depending on the frame used in data communications.

＊2 Use a Basic model QCPU (function version B) or later.
When using the function, version 8 or later of GX Developer is required.

2.5 Use with Redundant CPUs

This section describes the Q series C24 on an extension base unit of the system where Redundant CPUs are used.

(1) Available functions

For details, refer to the QnPRHCPU User's Manual (Redundant System).

(2) Access to Redundant CPU from external device

For details, refer to either of the following manuals.

- Section 5.1.4
- QnPRHCPU User's Manual (Redundant System)

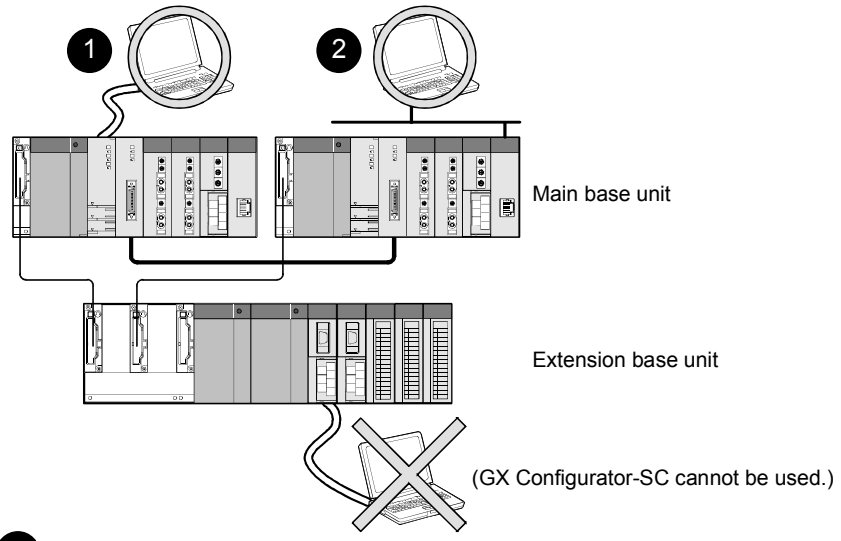
(3) Dedicated instructions

The dedicated instructions are not applicable.
Create programs with the FROM/TO instructions.
For sample program using the FROM/TO instructions, refer to the QnPRHCPU User's Manual (Redundant System).

(4) GX Configurator-SC

(a) Connecting GX Configurator-SC

GX Configurator-SC cannot be used for accessing a Redundant CPU via an intelligent function module on an extension base unit from GX Developer. Therefore, the pre-defined protocol communication is not available.
Connect a personal computer with a communication path indicated below.



1 Direct connection to the CPU

2 Connection through an intelligent function module on the main base unit (Through Ethernet module, MELSECNET/H module, or CC-Link module)

(b) Writing to the flash ROM

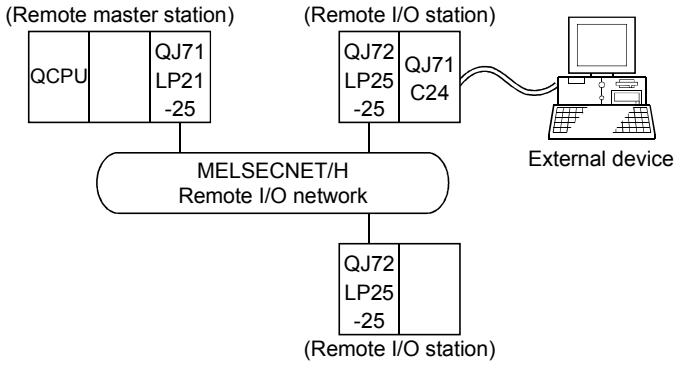
- On the "Transfer Setup" screen of GX Developer, select "Not specified" for Target system.
- A system switching during data writing may cause the data not to be written to the flash ROM.
  Change the operation mode of the Redundant CPU to Separate mode before writing to prevent such situation from occurring.
  If a system switching has occurred during data writing, write the data to the flash ROM again.

2.6 Use on MELSECNET/H Remote I/O Stations

This section describes the use of the Q series C24 at a MELSECNET/H remote I/O station.
It is not necessary to read this section if the Q series C24 is used with the QCPU.

(1) System configuration

(Example)



(2) Available functions

The following table lists the functions that can be used when the Q series C24 is mounted on a MELSECNET/H remote I/O station.

Function		Availability
Communications using the MC protocol		○ (＊1)
	Programmable controller CPU monitoring (Programmable controller CPU monitoring function)	○ (＊2)
Communications using non procedure protocol		○
	Data reception by interrupt program	×
	Programmable controller CPU monitoring (Programmable controller CPU monitoring function)	○ (＊2)
Communications using the bidirectional protocol		○
	Data reception by interrupt program	×
Communications using the pre-defined protocol		×
Communications using dedicated instructions		× (＊3)
Communications via public line, etc. (modem function)		○
	Remote password check	○ (＊4)
Transmission Control	DC code control (including Xon/Xoff control)	○
	DTR/DSR control	○
Communications protocol switching		○
Independent/linked operation of each interface		○
Initial setting and monitoring/testing of setting values by the utility package		○ (See (4))
Connecting the GX Developer		○

○ : Available × : Not available

*1 The following functions are available when communicating with the MELSECNET/H remote I/O station using the MC protocol.

Available function	Function
Device memory read/write	Batch read and batch write
	Random read, test (random write)
	Monitor data registration, monitoring
	Batch read of multiple blocks, batch write of multiple blocks
Buffer memory read/write	Reading/writing from/to the buffer memory of the Q series C24
Reading/writing buffer memory of an intelligent function module	Reading/writing from/to the buffer memory of the specified intelligent function module

The following devices of a MELSECNET/H remote I/O station can be accessed by the device memory read/write function. Note that the accessible devices and the ranges vary depending on the type of frames used for the data communication.
See the Reference Manual for a detailed explanation.

Device name	Device symbol	Device name	Device symbol
Special relay	SM	Link relay	B
Special register	SD	Data register	D
Input relay	X	Link register	W
Output relay	Y	Link special relay	SB
Internal relay	M	Link special register	SW

REMARKS

It is only possible to read/write from/to the buffer memory of an intelligent function module for the MELSECNET/10 remote I/O station compatible with the QnA/A series.

*2 Programmable controller CPU monitoring can be registered using the MC protocol or GX Configurator-SC.
The dedicated instruction CSET cannot be used for registration.
The device to be monitored can be registered within the device range of the MELECNET/H remote I/O station.

*3 The dedicated instructions are unavailable for the MELSECNET/H remote I/O station.
For the functions that use the dedicated instructions to make communication, perform programming by the following methods.

Dedicated instruction	Method	Explanation section
FROM, TO	Perform programming using the REMFR/REMTO instruction.	Appendix 9.2
ONDEMAND	Perform programming using the REMFR/REMTO instruction and I/O signal.	Appendix 9.3
INPUT		Appendix 9.4
OUTPUT		Appendix 9.5
BIDIN		Appendix 9.4
BIDOUT		Appendix 9.5
SPBUSY	No method	—
CSET (Receive data clear)	Perform programming using the receive data clear request area of the buffer memory.	Appendix 9.6
BUFRCVS	No method (Data cannot be received using an interrupt program)	—
PRR	Perform programming using the REMFR/REMTO instruction and I/O signal.	Appendix 9.7
CSET (Initial setting)		Appendix 9.8
CSET (Programmable controller CPU monitoring function)	No method (Register/delete the programmable controller CPU using the MC protocol or GX Configurator-SC.)	—
PUTE	Perform programming using the REMFR/REMTO instruction and I/O signal.	Appendix 9.9 Appendix 9.11
GETE		Appendix 9.10
UINI	Perform programming using the REMFR/REMTO instructions and I/O signals. (However, the station No. cannot be changed.)	Appendix 9.12
CPRTCL	No method (Communications using the pre-defined protocol are not available.)	—

*4 Available for the MELSECNET/H remote I/O station of function version D or later.
GX Developer Version 8.18U or later is required to use the function.

(3) Setting from GX Developer

The following parameters should be set through GX Developer in order to use the Q series C24 mounted to a MELECNET/H remote I/O station.
Each of setting is the same way as when setting the parameters for the Q series C24 mounted to a QCPU station: see Section 4.5 and after.
See the operating manual for GX Developer for how to display each setting screen.
(Parameter setting items for the Q series C24 mounted to a MELECNET/H remote I/O station)

Parameter setting item	Setting	Remarks
I/O Assignment	Set the module mounting information.	See Section 4.5.1
Switch setting for I/O and intelligent function module	Set the transmission specification and the communication protocol for communication with the external device.	See Section 4.5.2
Remote password setting	Perform settings for the remote password.	User's Manual (Application)

POINT

(1) Connect GX Developer to a MELECNET/H remote I/O station and set the parameters.
(2) Reset the MELECNET/H remote I/O station after changing the setting.

(4) When monitoring/setting with GX Configurator-SC

(a) About the automatic refresh setting
1) Use GX Developer to perform Read from PLC/Write to PLC of data created by the automatic refresh setting. It cannot be performed from GX Configurator-SC.
2) The devices used for the automatic refresh setting must be of the types M, B, D, or W.

POINT

(1) GX Configurator-SC should be connected to a MELECNET/H remote I/O station before the monitoring/setting.
(2) The MELECNET/H remote I/O station should be reset after changing the setting.

2.7 Checking the Function Version, Serial No., and Software Version

This section provides the information on function versions, serial Nos., and software versions of the related products that support new functions of the Q series C24 and explains how to check them.

(1) Correspondence of related products for use additional functions of Q series C24

Additional function		Function version of the Q series C24		Version of related product			
		QJ71C24N (-R2/R4)	QJ71C24 (-R2)	CPU module	GX Developer	GX Configurator-SC	GX Works2
Simultaneous connection of GX Developer and GOT		○	Function version B	○	○	○	○
Transmission specifications	RS(RTS) and ER(DTR) signal status designation	○	×	○	○	Version 2 or later	Version 1.15R or later
	Support for 230400 bps					○	
	Data transmission/ reception at low speed (50 bps)		Function version B				
Clearing reception data by a dedicated instruction		○	Function version B	○	○	○	○
Programmable controller CPU information clear		Function version B or later whose first 5 digits of the serial No. are 08032	×	○	○	Version 2.11M or later	Version 1.15R or later
Communication via modem function	Transmission of the programmable controller CPU monitoring information through combined use of the modem function	○	Function version B	○	○	SW0D5C-QSCU-E 20C or later	
	Automation initialization of modem		Function version B or later whose first 5 digits of the serial No. are 03043			Version 1.0 or later (Versions prior to SW0D5C-QSCU-E 40E are not usable.)	
	Callback				Version 7 or later		
Remote password check		○	Function version B	Function version A or later whose first 5 digits of the serial No. are 02092	Version 6 or later	SW0D5C-QSCU-E 20C or later	
Non procedure and non reception monitoring time format designation		○	×	○	○	Version 2 or later	
Transmission control start/end free area designation		○	×	○	○	Version 2 or later	
Addition of changeable data to the user frame	05H, 0BH, 11H, 17H	○	Function version B	○	○	SW0D5C-QSCU 20C or later	
	04H, 0AH		×			Version 2 or later	
	E5H, EBH	Function version B or later whose first 5 digits of the serial No. are 06062	×			Version 2.06G or later	
Reception according to user frames (reception according to format 1)		○	Function version B	○	○	SW0D5C-QSCU-E 20C or later	
Multiple specification of transparent codes for transmission		○	Function version B	○	○	SW0D5C-QSCU-E 20C or later	
Switching the GX Developer connection mode by switching the mode		○	×	○	○	○	○
Communication data monitoring function		○	×	○	Version 8 or later	Version 2 or later	Version 1.15R or later
UINI instruction		Function version B or later whose first 5 digits of the serial No. are 06062	×	○	○	○	○
Specification of station No. 65 to 120 by MC protocol (QnA compatible 4C/3C frame only)		○	×	Universal model QCPU of function version B or later whose first 5 digits of the serial No. are 09042.	○	○	○

<table>
<tr><th colspan="2" rowspan="2">Additional function</th><th colspan="2">Function version of the Q series C24</th><th colspan="4">Version of related product</th></tr>
<tr><th>QJ71C24N (-R2/R4)</th><th>QJ71C24 (-R2)</th><th>CPU module</th><th>GX Developer</th><th>GX Configurator-SC</th><th>GX Works2</th></tr>
<tr><td colspan="2">Access to link direct device LW10000 or higher using MC protocol
(QnA compatible 4C/3C frame only)</td><td>Function version B or later whose first 5 digits of the serial No. are 09043</td><td>×</td><td>Universal model QCPU of function version B or later whose first 5 digits of the serial No. are 09042.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="2">Access to extended data register D65536 or higher, or extended link register W10000 or higher using MC protocol
(QnA compatible 4C/3C/2C frame only)</td><td>Function version B or later whose first 5 digits of the serial No. are 09043</td><td>×</td><td>Universal model QCPU of function version B or later whose first 5 digits of the serial No. are 09042.</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="2">Echo back enable/disable setting for RS-422/485 interface</td><td>Setting to buffer memories</td><td>Can be set in buffer memory.
Function version B or later, first 5 digits of the serial No. are 10122 or greater (The QJ71C24N(-R4) only)</td><td rowspan="2">×</td><td rowspan="2">○</td><td rowspan="2">○</td><td>Monitor/Test available
Version 2.18U or later</td><td rowspan="2">Version 1.31H or later</td></tr>
<tr><td>System registration to the flash ROM</td><td>System registration to flash ROM available
Function version B or later, first 5 digits of the serial No. are 11062 or greater (The QJ71C24N(-R4) only)</td><td>System registration into the flash ROM can be performed.
Version 2.20W or later</td></tr>
<tr><td rowspan="8">Pre-defined protocol communication</td><td>Execution of the protocol selected from the pre-defined protocol library</td><td rowspan="2">Function version B or later, first 5 digits of the serial No. are 10122 or greater</td><td>×</td><td>○</td><td rowspan="8">Version 8.78G or later</td><td>Version 2.18U or later</td><td rowspan="8">Version 1.24A or later</td></tr>
<tr><td>Execution of the created or edited protocol</td><td>×</td><td>○</td><td rowspan="3">Version 2.20W or later</td></tr>
<tr><td>Addition of Sign character, Number of decimals, and Delimiter settings to Conversion variable</td><td rowspan="3">Function version B or later, first 5 digits of the serial No. are 11062 or greater</td><td>×</td><td>○</td></tr>
<tr><td>Variable number of characters setting for Non-verified reception</td><td>×</td><td>○</td></tr>
<tr><td>Acquisition of protocol setting data error information</td><td>×</td><td>○</td><td>×</td></tr>
<tr><td>Setting execution log options to buffer memories</td><td>Function version B or later, first 5 digits of the serial No. are 10122 or greater</td><td rowspan="2">×</td><td rowspan="2">○</td><td>Monitor/Test available
Version 2.18U or later</td></tr>
<tr><td>System registration of the execution log options to the flash ROM</td><td>Function version B or later, first 5 digits of the serial No. are 11062 or greater</td><td>System registration into the flash ROM can be performed.
Version 2.20W or later</td></tr>
</table>

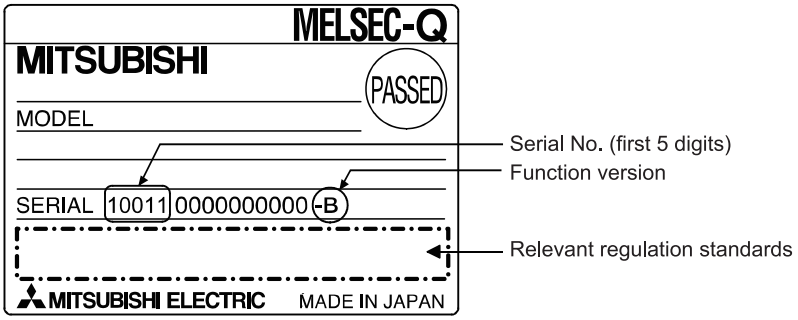
○ : Usable (no restrictions depending on the version) × : Not usable

(2) Checking serial number and function version

The serial number and function version of the Q series C24 can be checked on the rating plate, front of the module, or system monitor window in GX Developer.

(a) Checking on the rating plate

The rating plate is located on the side of the Q series C24.

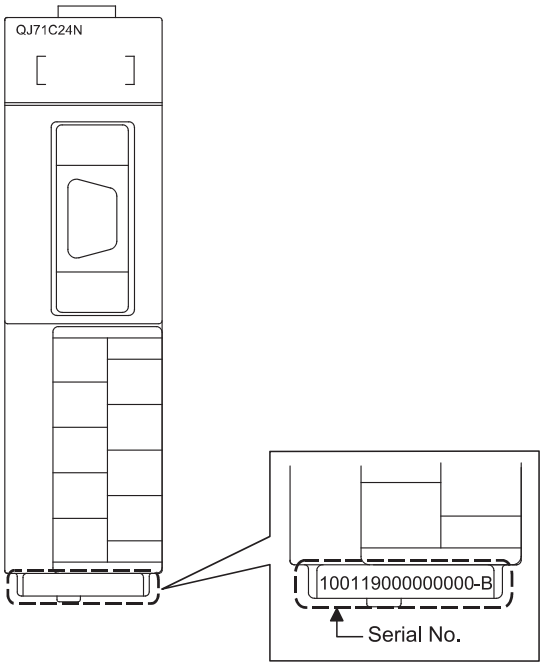


(b) Checking on the front of the module

The serial number and function version on the rating plate is printed on the front (at the bottom) of the module.

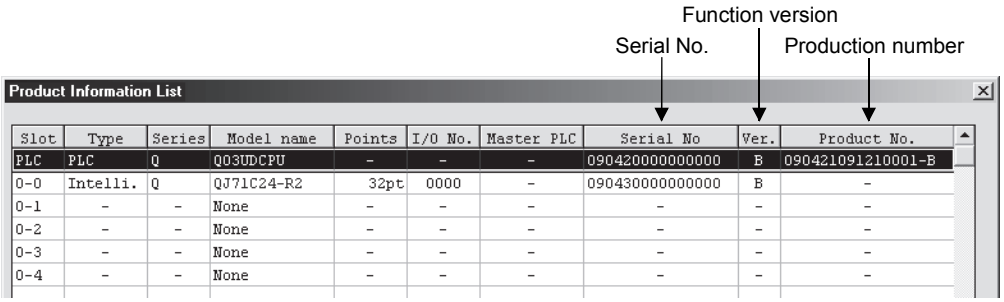
The following Q series C24 is not included.

- QJ71C24 or QJ71C24-R2.



(c) Checking on the System Monitor screen (Product Information List)

To display the system monitor, select [Diagnostics] → [System monitor] → Product Inf. List button of GX Developer.



Slot	Type	Series	Model name	Points	I/O No.	Master PLC	Serial No	Ver.	Product No.
PLC	PLC	Q	Q03UDCPU	-	-	-	090420000000000	B	0904210912100001-B
0-0	Intelli.	Q	QJ71C24-R2	32pt	0000	-	090430000000000	B	-
0-1	-	-	None	-	-	-	-	-	-
0-2	-	-	None	-	-	-	-	-	-
0-3	-	-	None	-	-	-	-	-	-
0-4	-	-	None	-	-	-	-	-	-

1) Production number display

Since the Q series C24 does not support the production number display, "-" is displayed.

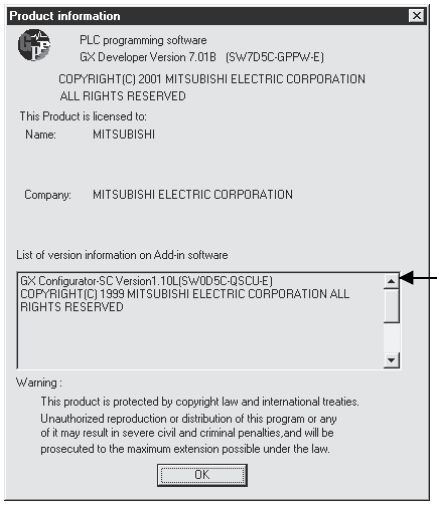
POINT

The serial number displayed on the Product Information List screen of GX Developer may differ from that on the rating plate or on the front of the module.

- The serial number on the rating plate or on the front of the module indicates the management information of the product.
- The serial number displayed on the Product Information List screen indicates the functional information of the product.
  The functional information of the product will be updated when a function is added.

(3) Checking the software version of GX Configurator-SC

To check the software version of GX Configurator-SC, select "Help" and then "Product information" from GX Developer.


Product information
PLC programming software
GX Developer Version 7.01B (SW7D5C-GPPW-E)
COPYRIGHT(C) 2001 MITSUBISHI ELECTRIC CORPORATION
ALL RIGHTS RESERVED
This Product is licensed to:
Name: MITSUBISHI
Company: MITSUBISHI ELECTRIC CORPORATION
List of version information on Add-in software
GX Configurator-SC Version1.10L(SW0D5C-QSCU-E)
COPYRIGHT(C) 1999 MITSUBISHI ELECTRIC CORPORATION ALL RIGHTS RESERVED
Warning :
This product is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program or any of it may result in severe civil and criminal penalties,and will be prosecuted to the maximum extension possible under the law.
OK
Software version

REMARKS

The version indication for the GX Configurator-SC has been changed as shown below from the SW0D5C-QSCU-E 40E upgrade product.

Previous product		Upgrade and subsequent versions
SW0D5C-QSCU-E 40E	→	GX Configurator-SC Version 1.10L

3 SPECIFICATIONS

The following shows the Q series C24 performance specifications.
For general specifications, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

3.1 Performance Specifications

The following shows the Q series C24 performance specifications. For the transmission specifications when communicating via the modem function, see this section and User's Manual (Application).

(1) Transmission specification

Item		Specifications		
		QJ71C24N QJ71C24	QJ71C24N-R2 QJ71C24-R2	QJ71C24N-R4
Interface	CH1	RS-232-compliance (D-sub 9 pin)	RS-232-compliance (D-sub 9 pin)	RS-422/485-compliance (2-piece plug-in connector socket block)
	CH2	RS-422/485-compliance (2-piece terminal block)	RS-232-compliance (D-sub 9 pin)	RS-422/485-compliance (2-piece plug-in connector socket block)
Communications system (＊1)	Line	Full-duplex/half-duplex communications		
	MC protocols communication	Half-duplex communications		
	Non procedure protocol communication	Full-duplex/half-duplex communications		
	Bidirectional protocol communication	Full-duplex/half-duplex communications		
	Pre-defined protocol communication (＊6)	Full-duplex/half-duplex communications		
Synchronization method		Start-stop synchronization method		
Transmission speed		[QJ71C24N(-R2/R4)] 50 / 300 / 600 / 1200 / 2400 / 4800 / 9600 14400 / 19200 / 28800 / 38400 / 57600 / 115200 / 230400 (bps) • Transmission speed 230400 bps is available for only CH1. (Not available for CH2) • Total transmission speed of two interfaces is available up to 230400 bps. • Total transmission speed of two interfaces is available up to 115200 bps when the communication data monitoring function is used. [QJ71C24(-R2)] 50 / 300 / 600 / 1200 / 2400 / 4800 / 9600 14400 / 19200 / 28800 / 38400 / 57600 / 115200 / - (bps) • Total transmission speed of two interfaces is available up to 115200 bps.		
Data format	Start bits	1		
	Data bits	7/8		
	Parity bits	1 (vertical parity) or none		
	Stop bits	1/2		
Access cycle	MC protocol communication	Processes one request during installed programmable controller CPU END processing. ＊ Number of scans that must be processed/number of link scans depends on the contents of the request. (See Reference Manual.)		
	Non procedure protocol communication Bidirectional protocol communication	Sends each time a send request is issued. Can receive at any time.		
	Pre-defined protocol communication (＊6)	Sends or receives data when requested with the dedicated instruction (CPRTCL).		
Error detection	Parity check	Selected for all protocols and when this check is enabled, ODD or EVEN is selected by a parameter.		
	Sum check code	For the MC or bidirectional protocol, selected by a parameter. For the non procedure protocol, selected in the user frame. For the pre-defined protocol, whether or not a sum check code is needed depends on the selected protocol. (＊6)		

(Continued on next page)

3 - 1

(Continued from preceding page)

<table>
<tr><th colspan="3" rowspan="2">Item</th><th colspan="3">Specifications</th></tr>
<tr><th>QJ71C24N
QJ71C24</th><th>QJ71C24N-R2
QJ71C24-R2</th><th>QJ71C24N-R4</th></tr>
<tr><td colspan="3">Transmission control</td><td colspan="3">
<table>
<tr><th></th><th>RS-232</th><th>RS-422/485</th></tr>
<tr><td>DTR/DSR control</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>RS/CS control</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>CD(DCD) signal control</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>DC1/DC3 (Xon/Xoff) control
DC2/DC4 control</td><td>Enabled</td><td>Enabled</td></tr>
</table>
• DTR/DSR signal control and DC code control are selected by the user.
</td></tr>
<tr><td rowspan="2">Line configuration (Connection) (* 2)</td><td>RS-232</td><td></td><td>1:1</td><td>1:1</td><td>—</td></tr>
<tr><td>RS-422/485</td><td></td><td>1:1, 1:n, n:1, m:n</td><td>—</td><td>1:1, 1:n, n:1, m:n</td></tr>
<tr><td rowspan="9">Line configuration (Data communication) (* 2)</td><td rowspan="4">RS-232</td><td>MC protocols communication</td><td>1:1</td><td>1:1</td><td rowspan="4">—</td></tr>
<tr><td>Non procedure protocol communication</td><td>1:1</td><td>1:1</td></tr>
<tr><td>Bidirectional protocols communication</td><td>1:1</td><td>1:1</td></tr>
<tr><td>Pre-defined protocol communication (* 6)</td><td>1:1</td><td>1:1</td></tr>
<tr><td rowspan="4">RS-422/485</td><td>MC protocols communication</td><td>1:1, 1:n, m:n</td><td rowspan="4">—</td><td>1:1, 1:n, m:n</td></tr>
<tr><td>Non procedure protocol communication</td><td>1:1, 1:n, n:1</td><td>1:1, 1:n, n:1</td></tr>
<tr><td>Bidirectional protocols communication</td><td>1:1</td><td>1:1</td></tr>
<tr><td>Pre-defined protocol communication (* 6)</td><td>1:1, n:1</td><td>1:1, n:1</td></tr>
<tr><td rowspan="2">Transmission distance (Overall distance)</td><td>RS-232</td><td>Maximum 15 m (49.2 ft.)</td><td>Maximum 15 m (49.2 ft.)</td><td>—</td></tr>
<tr><td>RS-422/485</td><td>Maximum 1200 m (3937 ft.) (overall distance)</td><td>—</td><td>Maximum 1200 m (3937 ft.) (overall distance)</td></tr>
<tr><td colspan="3">Flash ROM write count</td><td colspan="3">Maximum 100,000 times to the same area</td></tr>
<tr><td colspan="3">Number of occupied I/O points</td><td colspan="3">32 points per slot (I/O assignment: Intelli: 32 points) (* 3)</td></tr>
<tr><td rowspan="2">Recommended cable</td><td>RS-232</td><td colspan="3">7/0. 127 □P HRV-SV Outside diameter 8.5mm (0.33in.) or more
(Oki Electric Cable Co., Ltd. Applicable number is specified in □.)</td></tr>
<tr><td>RS-422/485</td><td colspan="3">SPEV (SB)-MPC-0.2 × 3P Outside diameter approx. 6.5mm (0.26 in.) (Mitsubishi Cable Industries, LTD.)
SPEV(SB)-0.2 × 3P Outside diameter approx. 7.5mm (0.3 in.) (Mitsubishi Cable Industries, LTD.) (* 4)</td></tr>
<tr><td colspan="3">Applicable connector for external wiring</td><td colspan="2">D-sub 9 pin (male) screw type (* 5)</td><td>—</td></tr>
<tr><td colspan="3">5V DC internal current consumption</td><td>0.31A</td><td>0.26A</td><td>0.39A</td></tr>
<tr><td colspan="3">External dimensions</td><td colspan="3">98 (3.86 in.) (H) × 27.4 (1.08 in.) (W) × 90 (3.54 in.) (D)[mm]</td></tr>
<tr><td colspan="3">Weight</td><td colspan="3">0.20kg (0.44lb)</td></tr>
</table>

*1 Set to transfer data with external devices using a full-duplex communication system when the Q series C24 is started. For switching to a half-duplex communication system, refer to the User's Manual (Application).

*2 Indicates possible combinations when connecting the programmable controller CPU and external devices (external device side: programmable controller CPU side). The total number of n and m+n is up to 32 stations.

*3 In order to use the Q series C24, it is necessary to set the GX Developer switches.
To set the GX Developer switches, refer to Section 4.5.

*4 Recommended cables SPEV (SB)-MPC-0.2 × 3P and SPEV (SB)-0.2 × 3P are equivalent in the electrical characteristics, but partially different in the outside diameter, internal wire colors, etc.

*5 See Section 3.2.1 (3) for the recommended connector.

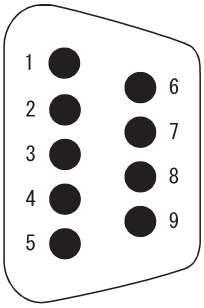
*6 Pre-defined protocol communication is available for the QJ71C24N, QJ71C24N-R2, and QJ71C24N-R4.

3.2 RS-232 Interface Specification

The following shows the RS-232 interface specifications.

3.2.1 RS-232 connector specifications

The following shows the specifications of the RS-232 connector that connects the Q series C24 to an external device.



Pin No.	Abbreviation	Signal name	Direction C24 ⟷ External device
1	CD(DCD)	Data carrier detect	←
2	RD(RXD)	Received data	←
3	SD(TXD)	Transmitted data	→
4	ER(DTR)	Data terminal ready	→
5	SG	Signal ground	↔
6	DR(DSR)	Data set ready	←
7	RS(RTS)	Request to send	→
8	CS(CTS)	Clear to send	←
9	CI(RI)	Ring indicator	←

(1) The control signals are described below. (The pin numbers of the connector are enclosed in parentheses.)

1) CD(DCD) signal (1)

- The Q series C24 operates according to the setting CD terminal check (see Section 9.4.5) of the Q series C24.

	CD terminal check enabled	CD terminal check disabled
Full-duplex communication	• The Q series C24 performs send and receive processing when the CD(DCD) signal (receive carrier detection) is ON. • If the CD(DCD) signal is turned off during data communication, the Q series C24 initializes the transmission sequence.	• The Q series C24 performs send and receive processing regardless of the ON/OFF status of the CD(DCD) signal. • Data communications is possible with an external device that cannot turn the CD(DCD) signal ON/OFF.
Half-duplex communication	See User's Manual (Application)	Setting impossible.

2) RD(RXD) signal
This is a signal to receive data.

3) SD(TXD) signal
This is a signal to send data.

4) ER(DTR) signal (4)
- When communicating data using the non procedure protocol, the Q series C24 turns on or off (on when data is receivable) depending on the amount of unused memory in the OS area allocated for receive data storage, if DTR/DSR control is being performed.
  Read the receive data from the sequence program, as the receive data is stored in the OS area when the ER(DTR) signal is OFF.
  If DTR/DSR control is not implemented, the ER(DTR) signal is always ON.
- If an MC protocol or bidirectional protocol is performing data communication, the Q series C24 turns ON when communications is enabled.

5) DR(DSR) signal (6)
- During DTR/DSR control, if this signal is OFF, the Q series C24 does not send data to the external device.
  Be sure that this signal is always turned ON when the external device is ready to receive.
- If DTR/DSR control is not implemented, the DR(DSR) signal status is ignored.

6) RS(RTS) signal (7)
- The Q series C24 turns ON/OFF the RS(RTS) signal as described below.
- When the communication system is full-duplex communications, if the Q series C24 ready (X1E) is ON, the Q series C24 turns ON the RS(RTS) signal.
- When the communication system is half-duplex communications, when the Q series C24 sends data to an external device, it turns ON the RS(RTS) signal.
- The RS(RTS) signal is not turned OFF even when the receive data cannot be stored in the Q series C24.

7) CS(CTS) signal (8)
- The Q series C24 does not send data to an external device when this signal is OFF.
- Be sure that this signal is always turned ON when the external device is ready to receive.

8) CI(RI) signal (9)
- The CI(RI) signal is used when the modem status is monitored on the Q series C24 side. It should be connected as needed. The CI(RI) signal is not needed to be connected when the modem is not connected.

(2) The ON and OFF states of each signal indicate the following conditions:

	(Output side)	(Input side)
ON	5 V DC to 15 V DC,	3 V DC to 15 V DC
OFF	–15 V DC to –5 V DC,	–15 V DC to –3 V DC

(3) Interface connector
Connectors of 9-pin D-sub (female) screw type (mating screw M2.6) are used as RS-232 interface connectors for the Q series C24.
For the relevant models, refer to Appendix 6.1.

The following table lists the suitable connector shell for the RS-232 connector.

Type	Model
Connector shell	17JE-23090-02(D8A)(-CG)＊1

＊ 1 Manufactured by DDK Ltd.

(4) Tightening torque

For details on the tightening torque for the RS-232 interface connector, refer to Section 4.1.

REMARKS

(1) Confirmation of RS-232 control signal status

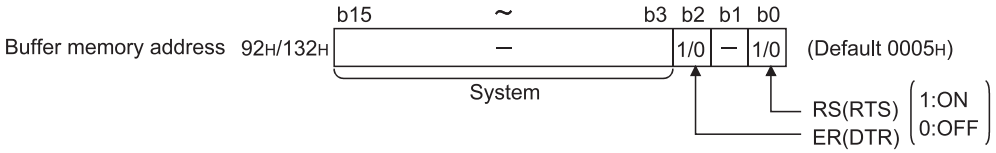
Each status of the control signals, ER(DTR), DR(DSR), RS(RTS) and CD(DCD) can be confirmed in RS-232 control signal status (address: 254H/264H).

Bit position	Buffer memory address	
	CH1 side	CH2 side
	254H	264H
b0	RS(RTS)	
b1	DR(DSR)	
b2	ER(DTR)	
b3	CD(DCD)	
b4	CS(CTS) ＊1	
b5	CI(RI)	
b6 to b15	—	

＊1 System area for QJ71C24 (-R2)

(2) Designation of RS and DTR signal status

The ON/OFF status of the RS(RTS) or ER(DTR) signal, which is normally set by the Q series C24, can be specified by turning ON/OFF the corresponding bit in RS(RTS) and ER(DTR) signal status designation (address: 92H /132H).
＊1 ＊2 ＊3 ＊4



＊1 The RS(RTS) signal is controlled by the Q series C24 in the following cases. (Ignore setting contents.)
- When data is communicated with half-duplex communication
- When communication time and the RS and CS signals are controlled by the modem function

＊2 The ER(DTR) signal is controlled by the Q series C24 in the following cases. (Ignore setting contents.)
- When the DTR/DSR signals are controlled
- When data is communicated by the modem function

＊3 After writing in the buffer memory, a lag of 0 to 20 ms occurs until it is reflected in the signal.

＊4 When a functional protocol, RS/DTR signal status specification (protocol No. 204 to 207), is executed with the CPRTCL instruction, the corresponding bit in the RS/DTR signal status specification (address: 92H/132H) turns on or off.
For functional protocol details, refer to the Operating Manual (Pre-defined protocol support function).

POINT
Be sure to control the RS(RTS) and ER(DTR) signals with the Q series C24. Control of the RS(RTS) and ER(DTR) signals by the user is a prime factor for data communication errors.

3.2.2 RS-232 cable specification

Use a 15 m (49.21 ft.), or shorter, cable conforming to the RS-232 standard as the RS-232 cable.

Diameter	Type	Material	Temperature rating
AWG28 to 24	Stranded	Copper	60°C or more

(Recommended cable)

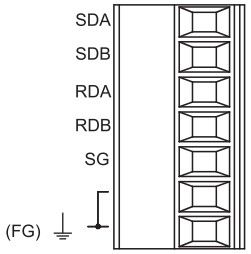
- Oki Electric Cable Co., Ltd.
  7/0.127 □P HRV-SV (□: Specify the number of pairs. For 13 pairs 7/0.127 13P HRV-SV)

3.3 RS-422/485 Interface Specifications

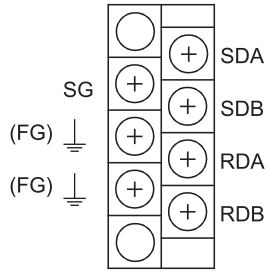
The following shows the RS-422/485 interface specification.

3.3.1 RS-422/485 terminal block specifications

The following shows the specifications of the RS-422 connector and RS-422/485 terminal block that connect to an external device.



QJ71C24N-R4



QJ71C24N
QJ71C24

Abbreviation	Signal name	Direction C24 ⟷ External device
SDA	Transmitted data (+)	→
SDB	Transmitted data (-)	→
RDA	Received data (+)	←
RDB	Received data (-)	←
SG	Signal ground	⟷
FG	Frame ground	⟷
FG	Frame ground	⟷

(1) The following describes the control signals.

1) SDA, SDB signals
These are signals to send data from the Q series C24 to the external device.

2) RDA, RDB signals
These are signals for the Q series C24 to receive data from the external device.

(2) Terminating resistor
Connect the termination resistor according to section 4.2.2.

(3) Terminal

(a) Terminal block (QJ71C24N)
Use 1.25-3 for the solderless terminal to be attached on the terminal block. Use the UL certified crimp-on terminal. For crimping the terminal, use the tools recommended by crimp-on terminal manufacturers. Crimp-on terminals with insulation sleeves cannot be used.

(b) Plug-in socket block (QJ71C24N-R4)
Remove the shielded part of the cable and directly connect the cable to the plug-in socket block.
Use the plate terminal (supplied with the product) to connect the braided shield wire to the FG terminal on the plug-in socket block. (Refer to Section 4.4.)

(4) Tightening torque
For details on the tightening torque for the RS-422/485 terminal block, refer to Section 4.1.

3.3.2 RS-422/485 cable specifications

The following table lists the RS-422/485 cable specification.

(1) Use a 1200 m (3937 ft.), or shorter, cable that satisfies the following specification for the RS-422/485 cable (cable to connect the Q series C24 terminal block).

Item	Description
Cable type	Shielded cable
Number of pairs	3P
Conductor resistance (20°C)	88.0 Ω /km or less
Insulation resistance	10000 MΩ •km or more
Dielectric strength	500 V DC, 1 minute
Electrostatic capacitance (1 kHz)	60nF/km or less on average
Characteristic impedance (100 kHz)	110 ± 10 Ω
Recommended conductor size	0.2 mm^2 to 0.75 mm^2
Diameter	22 to 16 AWG
Type	Stranded wire
Material	Copper wire
Temperature rating	60°C or more

(Recommended cable)
SPEV (SB)-MPC-0.2 × 3P ..... (MITSUBISHI CABLE INDUSTRIES, Ltd.)
SPEV (SB)-0.2 × 3P ..... (MITSUBISHI CABLE INDUSTRIES, Ltd.)
* SPEV (SB)-MPC-0.2 × 3P and SPEV (SB)-0.2 × 3P have the same electrical characteristics, but different external diameter and internal wire colors.

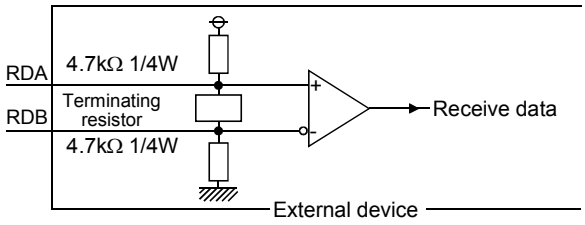
(2) Make the total distance within 1200 m (3937 ft.) when two or more devices are connected in a 1:n or m:n configuration.

3.3.3 Precautions when transferring data using RS-422/485 circuit

The following precautions must be observed when transferring data with an external device through the Q series C24 RS-422/485 interface.
Take the following into account when the transferring data with the external device.

(1) Error receive data countermeasures at external device during RS-422/485 connection

If the external device may receive erroneous data, install a pull-up or pull-down resistor to the external device as follows.
Installing a pull-up or pull-down resistor (resistance value criteria: approx. 4.7 kΩ 1/4 W) can prevent the reception of erroneous data.



POINT

When there is a pull-up or pull-down resistor at the external device, erroneous data is not received.

REMARKS

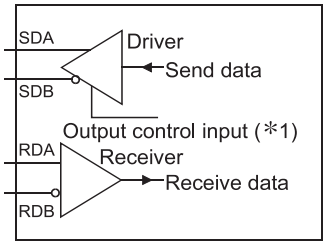
The following describes the case when a pull-up or pull-down resistor is not installed to the external device.
When no station is sending, the send line becomes high impedance and noise, etc. may cause the send line to change and the external device to receive erroneous data.
In this case, there is probably a parity error or framing error.
Therefore, skip the erroneous data.
Since the first data during data reception is fixed in the following cases, also skip the receive data until the fixed head data is received.

- When using an MC protocol to send data, the first data is fixed according to the frame and format the user uses.
- When transferring data using user frames with non procedure protocol or bidirectional protocol, the first data is selected according to the user frame that the user registers to the Q series C24.

(2) RS-422/485 interface operation

1) RS-422-485 interface construction

The following illustration shows the construction of the Q series C24 RS-422/485 interface driver (send)/receiver (receive).



*1 "Output control input" (also called send gate) of the driver (send) section of the illustration at the left determines whether or not data from SDA/SDB is output to the outside.

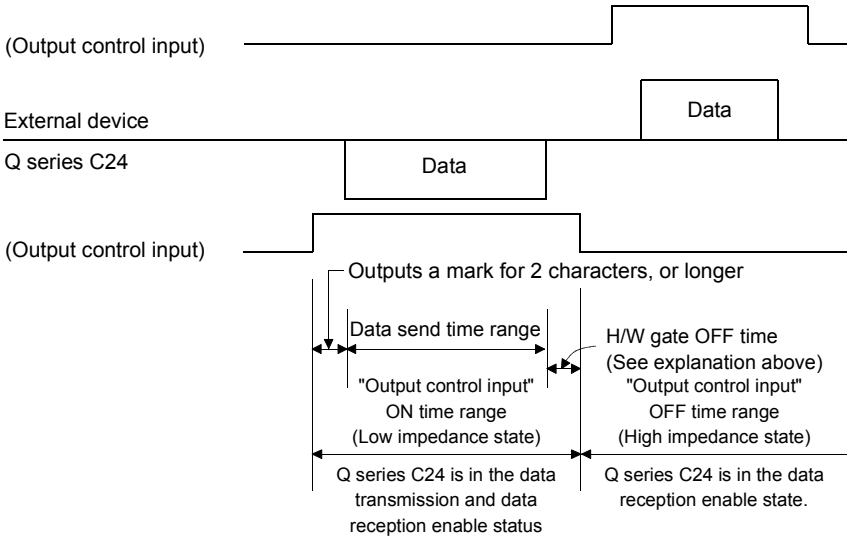
2) RS-422/485 interface operation

When the "Output control input" in the illustration above is ON, the interface enters the low impedance state (state in which data can be sent).
When the "Output control input" is OFF, the interface enters the high impedance state (state in which data cannot be sent).

3) Timing to start sending and to complete the transmission processing for the Q series C24

- Timing to start sending
  During data transmission, the Q series C24 outputs the actual data after sending a mark for 2 characters, or longer, after the high impedance set by the operations described in 1) and 2) above is reset.
- Transmission processing completion timing
  The following times are necessary as H/W gate OFF time from the time that data transmission is completed until transmission processing is completed (the state changes to the high impedance state). (The transmission rate set in the Q series C24 is the object.)

  When the transmission rate
  is 600 bps or higher : Data transfer time of less than 1 bit.
  When the transmission rate
  is 50 bps, 300 bps : several ms


(Output control input)
External device
Data
Q series C24
Data
(Output control input)
Outputs a mark for 2 characters, or longer
Data send time range
H/W gate OFF time
(See explanation above)
"Output control input"
ON time range
(Low impedance state)
"Output control input"
OFF time range
(High impedance state)
Q series C24 is in the data transmission and data reception enable status
Q series C24 is in the data reception enable state.

POINT

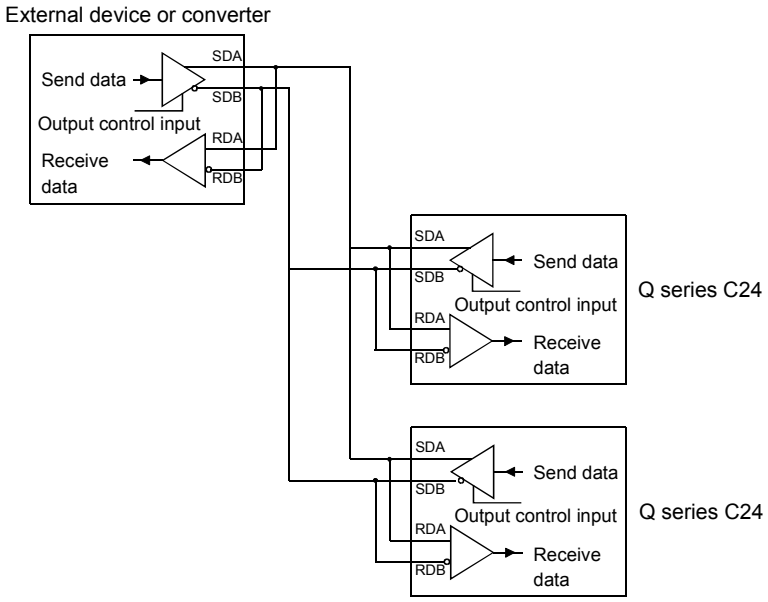
(1) When the external device and the Q series C24 connected in n:1 and m:n configurations

When the send signal of each device is connected as shown below, if the "Output control input" is turned ON at two or more devices, the relevant devices output (send) data at the same time.

For the external device to transfer data normally,

- "Output control input" must be turned ON only when sending data.
- "Output control input" must be turned OFF when not sending data.

The Q series C24 side automatically controls the output control input.



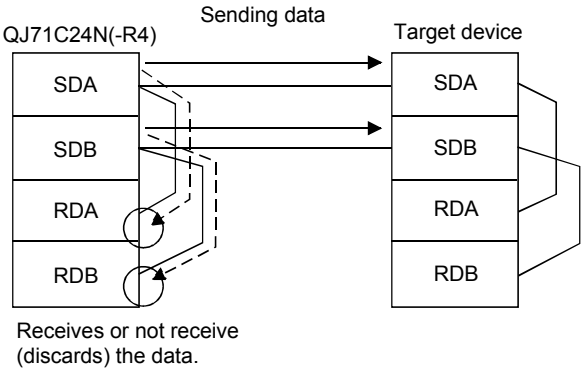
(2) When the Q series C24 is used, if operation of the two interfaces is linked (see Section 4.5.2 (2)), the time to send one character becomes the Q series C24 H/W gate OFF time.

(The Q series C24 turns OFF the gate after the one-character send time.)

3.3.4 Enabling or disabling echo back of the RS-422/485 interface

The echo back function is enabled or disabled for CH2 of the QJ71C24N(-R4).
The echo back of the QJ71C24N(-R4) is defined as the function that, when data are sent through RS-485 (2-wire type) from the RS-422/485 interface, the same data are also sent to RDA or RDB of the QJ71C24N(-R4).

Whether to receive the returned data or not (discard) can be specified.



(1) Application

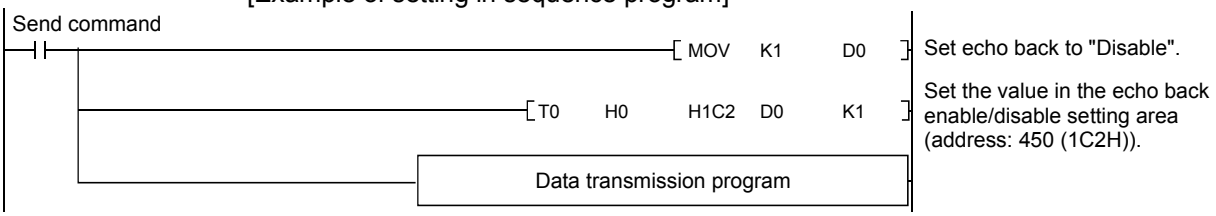
1) Disabling the echo back will eliminate the processing for ignoring unnecessary data, which has been programmed for non procedure protocol communication.
2) When the same message format is used for request (command) and response in the pre-defined protocol communication, proper communication with the other device can be performed by disabling the echo back.

(2) Setting method

1) Setting by GX Configurator-SC
   Enable or disable the function on the "CHn Transmission control and others system setting" screen.
   For details, refer to Section 9.4.5.
2) This function is set in sequence programs.
   In the echo back enable/disable setting area (address: 450(1C2H)), set either of the following values. (Default: 0)

Set value	Description
0: Enable echo back	When the QJ71C24N(-R4) sends data, it also receives the sent data in its own RDA or RDB.
1: Disable echo back	When the QJ71C24N(-R4) sends data, it does not receive the sent data in its own RDA or RDB. (The data are discarded.)

[Example of setting in sequence program]


Send command
MOV K1 D0
Set echo back to "Disable".
T0 H0 H1C2 D0 K1
Set the value in the echo back enable/disable setting area (address: 450 (1C2H)).
Data transmission program

POINT
The echo back enable/disable setting must be done before sending data. Any setting changed during transmission does not take effect.

3.4 Serial Communication Module Function List

The following table lists the functions of the Q series C24.

Function				Reference section
Communication using MC protocol (＊1)	Communication with ASCII code	Communication with QnA compatible 3C frame	Formats 1 to 4 exist for each.	Chapter 5 Reference Manual
		Communication with QnA compatible 4C frame		
		Communication with QnA compatible 2C frame		
		Communication with A compatible 1C frame		
	Communication with binary code	Communication with QnA compatible 4C frame	Format 5	
	Read/write of device memory	Batch read/write in bit/word units		
		Monitoring of device memory		
		Batch read/write of multiple blocks		
		Read/write by extension designation		
		Accessing other stations via network system		
	Reading/writing from/to the buffer memory of the Q series C24			
	Reading/writing from/to the buffer memory of intelligent function modules			
	Reading/writing from/to sequence program files			
	Monitoring the programmable controller CPUs (programmable controller CPU monitoring function)			
	Status control of the programmable controller CPUs (remote RUN/STOP, etc.)			
	Turning on/off input signals of the Q series C24 from an external device (global function)			
	Data transmission from a programmable controller CPU to an external device (on-demand function)			
Communication using non procedure protocol (＊2)	Data transmission/reception in any format			Chapter 6
	Data transmission/reception using user frames			User's Manual (Application)
	Data reception by interrupt programs			
	Monitoring the programmable controller CPUs (programmable controller CPU monitoring function)			
	ASCII data transmission/reception by ASCII-BIN conversion			
	Data transmission/reception by specifying transparent code			
Communication using bidirectional protocol (＊1)	Data transmission/reception in any format			Chapter 7
	Data reception by interrupt programs			User's Manual (Application)
	ASCII data transmission/reception by ASCII-BIN conversion			
	Data transmission/reception by specifying transparent code			
Communication using pre-defined protocol (＊2)	Data transmission/reception by a protocol selected from the pre-defined protocol library			Chapter 8, Operating Manual (Pre-defined protocol support function)
	Data transmission/reception by a created or edited protocol			
Communication via public network, etc. (modem function)	Communication with MC Protocol/non procedure protocol/bidirectional protocol			User's Manual (Application)
	Programmable controller access from GX Developer			
Transmission control	DC code control (including Xon/Xoff control)			
	DTR/DSR control			
Independent/linked operation of each interface				Section 4.5.2
Monitoring/testing of initial settings and setting values with utility software				Chapter 9
Supporting multiple CPU system				Reference Manual
Remote password check				User's Manual (Application)
Echo back enable/disable setting for RS-422/485 interface				Section 3.3.4

＊1 If the external device is capable of incorporating a program and communicating data using a protocol of a MELSEC programmable controller, it is possible to access the programmable controller CPU using the MC protocol.
Communication of any data is also available using the bidirectional protocol.

*2 When the protocol of an external device, such as a measuring instrument or a bar code reader must be used, data communication is available by the non procedure protocol or pre-defined protocol.
- Data communication by non procedure protocol
  Using user frames makes send/receive data processing easy.
- Data communication by pre-defined protocol
  The protocol of the external device can be simply selected, created, or edited on the screen of GX Configurator-SC (Pre-defined protocol support function).
  This can eliminate some communication control programs appropriate to the external device, reducing the steps for creating sequence programs.

3.5 Dedicated Instruction List

The following table lists dedicated instructions that can be used in the Q series C24.

○ : Available × : Not available

Classification	Instruction	Description		Protocol				Reference section
				MC	Non	Bi	Pd	
For data communication	ONDEMAND	Sends data with the on-demand function		○	×	×	×	Chapter 10
	OUTPUT	Sends designated number of data		×	○	×	×	
	INPUT	Receives data (reads received data)		×	○	×	×	
	BIDOUT	Sends data		×	×	○	×	
	BIDIN	Receives data (reads received data)		×	×	○	×	
	SPBUSY	Reads the status of data sent/received with each dedicated instruction		○	○	○	○	
	CSET	Allows clearing data received up to the present without interrupting the data transmission processing		×	○	×	×	
	BUFRCVS	Receives data with an interrupt program (reads received data)		×	○	○	×	User's Manual (Application)
	PRR	Sends data with user frames using transmission schedule table		×	○	×	×	
	CPRTCL	Executes the protocol setting data written to the flash ROM by Pre-defined protocol support function.		×	×	×	○	Chapter 10
Setting value registration/ reading	PUTE	Stores user frames in flash ROM of the Q series C24 (writing)		○	○	○	○	User's Manual (Application)
	GETE	Reads user frames stored in flash ROM of the Q series C24		○	○	○	○	
Programmable controller CPU monitoring instructions	CSET	Performs programmable controller CPU monitoring registration	For programmable controller CPU monitoring function	○	○	×	×	
		Cancels programmable controller CPU monitoring						
Initial value setting instruction		Sets the unit for the number of communication data (words/bytes) and the data communication area				○		
Mode switching instruction	UINI	Changes the mode, transmission specifications and host station No. of the Q series C24		○	○	○	○	

* Abbreviations used in the Protocol column
MC: MC protocol
Non: Non procedure protocol
Bi: Bidirectional protocol
Pd: Pre-defined protocol

3.6 Utility Package (GX Configurator-SC) Function List

The following table lists the utility package function for the Q series C24.

(○ : Protocol for which setting is valid)

Function			Protocol				Explanation page	Remarks
			MC	Non	Bi	Pd		
Auto refresh setting		Refresh the Q series C24's error codes and set devices on the programmable controller CPU side.	○	○	○	○	Section 4.6	Can be used via online operation. Can be used via offline operation.
User frame		Register the user frame in the flash ROM.	○	○	—	—	Section 9.4.1	
Data for modem initialization		Register the data for modem initialization in the flash ROM.	○	○	○	—	Section 9.4.2	
Data for modem connection		Register the data for model connection in the flash ROM.	○	○	○	—	Section 9.4.3	
Modem function system setting		Register the system setting values for model function in the flash ROM.	○	○	○	—	Section 9.4.4	
System setting	CHn Transmission control and others system setting	Set the transmission specifications with the other device. (DTR/DSR control, DC code control, communication method, data communication monitoring timer value, etc.)	○	○	○	○	Section 9.4.5	
	CHn MC protocol system setting	Assign the buffer memory for on-demand function, set the user frame number, etc.	○	—	—	—	Section 9.4.6	
	CHn Non procedure system setting	Assign the buffer memory needed to perform data communication using the non procedure protocol, and change the setting values, etc.	—	○	—	—	Section 9.4.7	
	CHn Bidirectional system setting	Assign the buffer memory needed to perform data communication using the bidirectional protocol, and change the setting values, etc.	—	—	○	—	Section 9.4.8	
	CHn Pre-defined protocol system setting	Change the set values for data communication by the pre-defined protocol.	—	—	—	○	Section 9.4.9	
	CHn PLC CPU monitoring system setting	Set the programmable controller CPU monitoring function.	○	○	—	—	Section 9.4.10	
	CHn Transmission user frame No. designation system setting	Set the user frame number to be transmitted, etc.	—	○	—	—	Section 9.4.11	
System setting default		Reset the setting values in the buffer memory to their default values.	○	○	○	○	Section 9.4.12	Can be used only via online operation.
System setting write		Write the setting values in the buffer memory to the flash ROM.	○	○	○	○	Section 9.4.12	
Flash ROM write allow/prohibit designation		Set whether to allow or prohibit writing to the flash ROM.	○	○	○	○	Section 9.4.13	
X/Y monitor/test		Perform the monitoring/testing of I/O signals to/from the programmable controller CPU.	○	○	○	○	Section 9.6.1	
Modem function monitor/test		Monitor the execution status of the modem function.	○	○	○	—	Section 9.6.2	
Monitor	CHn Transmission control and others monitor/test	Monitor the status of interface control signals, values set from the GX Developer, etc.	○	○	○	○	Section 9.6.3	
	CHn MC protocol monitor	Monitor the data communication result, I/O signal status, and setting values in the buffer memory.	○	—	—	—	Section 9.6.4	
	CHn Non procedure monitor/test		—	○	—	—	Section 9.6.5	
	CHn Bidirectional monitor		—	—	○	—	Section 9.6.6	
	CHn Pre-defined protocol monitor/test	Monitor the data communication result, I/O signal status, and setting values in the buffer memory.	—	—	—	○	Section 9.6.7	
	CHn PLC CPU monitoring monitor	Monitor the setting values and operating status of the programmable controller CPU monitoring function.	○	○	—	—	Section 9.6.8	
	CHn User frame No. designation monitor for transmission	Monitor the setting value for user frame to be transmitted.	○	○	—	—	Section 9.6.9	
Monitor/test others		Monitor the data reception result, error occurrence status, etc.	○	○	○	○	Section 9.6.10	
ERR LED off		Turn off the ERR LEDs on the front face of the module.	○	○	○	○	Section 9.6.11	

Function		Protocol				Explanation page	Remarks
		MC	Non	Bi	Pd		
Non procedure protocol receive data clear	Clear the currently received data.	—	○	—	—	Section 9.7	Can be used only via online operation.

* Abbreviations used in the Protocol column
MC: MC protocol
Non: Non procedure protocol
Bi: Bidirectional protocol
Pd: Pre-defined protocol

3.7 List of GX Developer Setting Items for Serial Communication Modules

The following table lists the parameters that are set using the GX Developer.

Parameter setting item	Parameter description	Set data		Reference section
I/O assignment setting	Performs I/O assignment for the Q series C24 and enables the switch settings listed below.	Type		Section 4.5.1
		Model name		
		Points		
		Start X/Y		
Switch setting	Switch 1	CH1 Transmission setting		Section 4.5.2
		CH1 Communication rate setting		
	Switch 2	CH1 Communication protocol setting		
	Switch 3	CH2 Transmission setting		
		CH2 Communication rate setting		
	Switch 4	CH2 Communication protocol setting		
	Switch 5	Station number setting		
Interrupt pointer setting	Performs setting for reading reception date with interrupt programs.	CPU side	Interrupt pointer Start No.	Section 4.5.3
			Interrupt pointer No. of units	
		Intelligent module side	Start I/O No.	
			Start SI No.	
Remote password settings	Sets the remote password and the Q series C24 that performs the check.	Password settings		User's Manual (Application)
		Password active module settings	Model name	
			Start XY	

3.8 List of Input/Output Signals for the Programmable Controller CPU

This section describes the input/output signals of the Q series C24.
The following I/O signal assignment is based on the case where the start I/O No. of the Q series C24 is "0000" (installed to slot 0 of the main base unit).
Device numbers starting with X indicate input signals from the Q series C24 to the programmable controller CPU.
Device numbers starting with Y indicate output signals from the programmable controller CPU to the Q series C24.
The following table lists the input/output signals for the programmable controller CPU.

Device number	Signal description	Reference section	Device number	Signal description	Reference section
X0 ＊1	CH1 Transmission normal completion ON: Normal completion	Section 9.6.4 Section 9.6.5 Section 9.6.6	Y0	CH1 Transmission request ON: Requesting transmission	—
X1 ＊1	CH1 Transmission abnormal completion ON: Abnormal completion		Y1	CH1 Reception data read completion ON: Data read completed	
X2 ＊1	CH1 Transmission processing ON: Transmission in progress		Y2	CH1 Mode switching request ON: Requesting switch	Application
X3 ＊2	CH1 Reception data read request ON: Requesting read	Section 6.1 Section 7.1 Section 9.6.5 Section 9.6.6	Y3	Use prohibited	—
X4 ＊2	CH1 Reception abnormal detection ON: Abnormal detection		Y4		
X5	(For system)	—	Y5		
X6 ＊3	CH1 Mode switching ON: Switching	Application	Y6		
X7 ＊1	CH2 Transmission normal completion ON: Normal Completion	Section 9.6.4 Section 9.6.5 Section 9.6.6	Y7	CH2 Transmission request ON: Requesting transmission	—
X8 ＊1	CH2 Transmission abnormal completion ON: Abnormal completion		Y8	CH2 Reception data read completion ON: Data read completed	
X9 ＊1	CH2 Transmission processing ON: Transmission in progress		Y9	CH2 Mode switching request ON: Requesting switch	Application
XA ＊2	CH2 Reception data read request ON: Requesting read	Section 6.1 Section 7.1 Section 9.6.5 Section 9.6.6	YA	Use prohibited	—
XB ＊2	CH2 Reception abnormal detection ON: Abnormal detection		YB		
XC	(For system)	—	YC		
XD ＊3	CH2 Mode switching ON: Switching	Application	YD		
XE	CH1 ERR. occurrence ON: Error occurring	Section 9.6.11 Section 11.1.2	YE	CH1 ERR. clear request ON: Requesting error clear	Section 9.6.11 Section 11.1.2
XF	CH2 ERR. occurrence ON: Error occurring		YF	CH2 ERR. clear request ON: Requesting error clear	
X10 ＊6	Modem initialization completion ON: Initialization completed	Section 9.6.2 Application	Y10 ＊6	Modem initialization request (standby request) ON: Requesting initialization	Section 9.6.2 Application
X11 ＊6	Dialing ON: Dial in progress		Y11 ＊6	Connection request ON: Requesting connection	
X12 ＊6	Connection ON: Connection in progress		Y12 ＊6	Modem disconnection request ON: Requesting disconnection	
X13 ＊6	Initialization/connection abnormal completion ON: Initialization/ connection abnormally completed		Y13	Use prohibited	—
X14 ＊6	Modem disconnection complete ON: Disconnection completed		Y14 ＊6	Notification- issued request OFF: Requesting notification issuance	
X15 ＊6	Notification normal completion ON: Normal completion		Y15	Use prohibited	—
X16 ＊6	Notification abnormal completion ON: Abnormal completion		Y16		
X17 ＊1	Flash ROM read completion ON: Completed	—	Y17	Flash ROM read request ON: Requesting	—
X18 ＊1	Flash ROM write completion ON: Completed		Y18	Flash ROM write request ON: Requesting	
X19	Flash ROM system setting write completion ON: Completed		Y19	Flash ROM system setting write request ON: Requesting	

Device number	Signal description	Reference section	Device number	Signal description	Reference section
X1A	CH1 Global signal ON: Output instructed	Reference	Y1A	Use prohibited	—
X1B	CH2 Global signal ON: Output instructed		Y1B		
X1C	System setting default completion ON: Completed	Section 9.4.12	Y1C	System setting default request ON: Requesting	Section 9.4.12
X1D ＊7	Pre-defined protocol ready ON: Ready	Section 8.1.5	Y1D	Use prohibited	—
X1E ＊4	Q series C24 ready ON: Accessible	—	Y1E		
X1F ＊5	Watchdog timer error (WDT error) ON : Module error occurred OFF: Module being normally operated	—	Y1F		

＊1 The device does not turn on/off by execution of a dedicated instruction when a function that corresponds to the input signal is used.

＊2 The device does turn on/off by execution of a dedicated instruction when a function that corresponds to the input signal is used (from ON to OFF: Data read completed).

＊3 The mode switching (X6/XD) turns ON when the following function is executed.
- Mode switching, transmission sequence initialization, reception data clear (by buffer memory), user frame use enable/disable designation, UINI instruction, programmable controller CPU information clear

While the mode switching (X6/XD) is ON, do not issue a communication request to the target interface. (The communication processing of the Q series C24 is stopped while the mode switching (X6/XD) is ON.)

＊4 The Q series C24 ready indicates whether or not it is possible to access the Q series C24 from the programmable controller CPU. Use it as an interlock signal for a sequence program.

＊5 Restart the programmable controller CPU when the watchdog timer error is turned on (reset the power and the CPU module).

＊6 QJ71C24N-R4 cannot be used. (Related to modem function signal.)
- X10 to X16: For system
- Y10 to Y16: Use prohibited

＊7 Pre-defined protocol ready (X1D) is a signal that turns on when pre-defined protocol communication becomes ready.

IMPORTANT

(1) Of the input/output signals to the programmable controller CPU, the signals marked with "Use prohibited" must not be output (ON).
If any of the "Use prohibited" signals is output, the programmable controller system may malfunction.

(2) When the modem function is not used or the QJ71C24N-R4 is used, X10 to X16 are used for the system and Y10 to Y16 cannot be used.

POINT

(1) The input/output signals shown in this section are the signals used when a QnA series serial communication module program is utilized for the Q series C24 (see Section 2 in Appendix).
In the QCPU, the on/off of input/output signals to intelligent function modules is executed with a dedicated instruction.
It is not necessary to turn the signals on/off by the sequence program, except for the input/output signals shown in the programming of each function reference page.

(2) When a program for a QnA series serial communication module is also utilized for the Q series C24, it is recommended to replace the instructions with the dedicated instructions shown on the corresponding function reference page of each manual for the Q series C24.

3.9 List of Applications and Assignments of the Buffer Memory

This section describes the buffer memory.

(1) Configuration of the buffer memory

A buffer memory consists of a user area and a system area, as described below.

(a) User area

1) This is the area where users write/read data.
2) The user area consists of areas for storing setting values for data communication, for actual data communication, and for storing communication status and communication error information.
3) Data read/write to the user area should be performed following the instructions in the corresponding detailed reference page

(b) System area

This area is used by the Q series C24 system.

(2) List of buffer memory assignments

A buffer memory is configured with 16 bits per address.
The name, default value, etc. of each address of the buffer memory is listed in the table on the following pages.

1) Abbreviations in the Protocol column
   MC: MC protocol
   Non: Non procedure protocol
   Bi: Bidirectional protocol
   Pd: Pre-defined protocol
2) Meaning of symbols shown in the Protocol column
   The following symbols are assigned to protocols related to the setting values of a corresponding area and to areas used for controlled with user settings, and indicate what kind of access is allowed to the area in question.
   RW : Area where it is possible to read/write from/to the programmable controller CPU and an external device.
   R : Area where only reading is possible from the programmable controller CPU and an external device.
   – : System area used by the system or area not used by the corresponding protocol.
3) Meaning of symbols shown in the Registration column
   Indicates whether or not it is possible to use a value in the corresponding area by registering it to the flash ROM of the Q series C24.
   Allowed : Area that can be registered and used.
   Not allowed : Area that cannot be registered.

IMPORTANT

Do not write data in the "System area" of the buffer memory.
If data is written to any of the system areas, the programmable controller system may malfunction.
Some of the user areas are partially system areas. Care must be taken when performing read/write to the buffer memory.

POINT

(1) Use the FROM/TO instructions or other applicable commands to access the buffer memory listed in this section when a program for a QnA series serial communication module is utilized for the Q series C24 (see Section 2 in Appendix).
In QCPU, the access to the buffer memory of an intelligent function module is executed with a dedicated instruction.
It is not necessary to access directly using the FROM/TO instructions or other instructions from the sequence program, except when accessing the buffer memory as shown in the programming on each function reference page.

(2) When a program for a QnA series serial communication module is utilized for the Q series C24, it is recommended to replace the instructions with the dedicated instructions shown on the corresponding function reference page of each manual for the Q series C24.

(3) To use the dedicated instructions, change the following initial settings (default values) for data communications by registration operation from GX Configurator-SC or by the CSET instruction for the sequence program.

1) Initial settings for communication using the MC protocol
   - Setting the unit of data length sent by the on-demand function
     Word/byte units designation (addresses: 150 (96H)/310 (136H))
   - Setting the buffer memory used by the on-demand function
     Buffer memory head address designation (addresses: 160 (A0H)/320 (140H))
     Transmission buffer memory length designation (addresses: 163 (A3H)/323 (143H))

2) Initial settings for communication using the non procedure/bidirectional protocols
   - Setting the unit of data length to be sent and received
     Word/byte units designation (addresses: 150 (96H)/310 (136H))
   - Setting the transmission area
     Transmission buffer memory head address designation (addresses: 162 (A2H)/322 (142H))
     Transmission buffer memory length designation (addresses: 163 (A3H)/323 (143H))
   - Setting the reception area
     Receive buffer memory head address designation (addresses: 166 (A6H)/326 (146H))
     Receive buffer memory length designation (addresses: 167 (A7H)/327 (147H))

＊ For more details on the registration operation by GX Configurator-SC, see the explanation of the system settings of the corresponding protocol in Sections 9.4.5 to 9.4.8.
For more details on the CSET instruction, see the User's Manual (Application).

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
0 (0H)	—	For LED and communi-cation error clear	Communication error clear request for CH1 and to turn LED off 0: ON, No initialization request 1: OFF, Initialization requested SD WAIT (b0) C/N (b4) SIO (b1)) NAK (b5) PRO. (b2) ACK. (b6) P/S (b3) NEU. (b7) For system (b8) to (b15)	0	RW				Not allowed	Section 9.6.11 Section 11.1.1 Section 11.1.2
—	1 (1H)		Communication error clear request for CH2 and to turn LED off 0: ON, No initialization request 1: OFF, Initialization requested SD WAIT (b0) NAK (b5) SIO (b1) ACK. (b6) PRO. (b2) NEU. (b7) P/S (b3) CH2 ERR. (b14) C/N (b4) CH1 ERR. (b15) For system (b8) to (b13)							
2 (2H)		For flash ROM access	Register/read/delete instructions 0: No request 1: Register request 2: Read request 3: Delete request	0	RW	—			Not allowed	Section 9.4.1 Section 9.4.2 Section 9.4.12 Section 9.4.13
3 (3H)			Frame No. direction 0: No designation Other than 0: Frame No.							
4 (4H)			Registration/read/delete result storage 0: Normal completion Other than 0: Abnormal completion							
5 (5H)			Number of data bytes registered designation 0 : No designation Other than 0: Number of data bytes registered (maximum 80 bytes)							
6 to 45 (6H to 2DH)			User frame 0 : No designation Other than 0: Registered data (maximum 80 bytes)							
46 (2EH)		For designation of modem function-1	Modem connection channel designation 0: Non 1: CH1 2: CH2	0	RW			—	Allowed	Section 9.4.2 Section 9.4.3 Section 9.4.4 User's Manual (Application)
47 (2FH)			Notification execution designation 0: Do not execute. 1: Execute.							
48 (30H)			Number of connection retries designation 1 to 5: Number of retries	3						
49 (31H)			Connection retry interval designation 90 to 300: Connection retry interval (unit: s)	180						
50 (32H)			Initialization/connection timeout designation 1 to 60: Timeout (unit: s)	60						
51 (33H)			Number of initialization retries designation 1 to 5: Number of retries	3						
52 (34H)			Data No. for initialization designation 0H : Send initialization data designated by the designated area of the user frame for transmission. 7D0H to 801FH: Data No. for initialization	7D0H						
53 (35H)			Data No. for connection designation 0H : No designation BB8H to 801FH: Data No. for connection	0						
54 (36H)			GX Developer connection designation 0: Do not connect. 1: Connect.							
55 (37H)			No - communication interval time designation 0 : Wait infinitely 1 to 120: No communication interval (Waiting time for line disconnection) (unit: min.)	30						
56 (38H)			RS · CS control yes/no designation 0: No control 1: Controlled	1						
57 to 127 (39H to 7FH)		Use prohibited	System area	—						

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
128 (80H)		For programmable controller CPU information clear(＊1)	Programmable controller CPU information clear request 0000H: No request 4C43H: Requested	0	RW	—			Not allowed	Section 11.1.7
129 to 143 (81H to 8FH)		Use prohibited	System area	—						
144 (90H)	304 (130H)	For designation of mode switching	Switching mode no. designation (0001H to 0007H,0009H, 00FFH) 0000H: No designation 0001H: MC protocol (format 1) 0002H: MC protocol (format 2) 0003H: MC protocol (format 3) 0004H: MC protocol (format 4) 0005H: MC protocol (format 5) 0006H: Non procedure protocol 0007H: Bidirectional protocol 0009H: Pre-defined protocol 00FFH: GX Developer connection	0	RW				Not allowed	Section 4.5.2 User's Manual (Application)
145 (91H)	305 (131H)		Transmission specifications after switching designation Designates transmission specifications (below) after switching when b15 of this area is 1 (ON). Operation setting (b0) 0: Independent 1: Link Data bit (b1) 0: 7 bit 1: 8 bit Parity bit (b2) 0: No 1: Yes Odd/even parity (b3) 0: Odd 1: Even Stop bit (b4) 0: 1 bit 1: 2 bit Sum check code (b5) 0: No 1: Yes Write during RUN (b6) 0: Prohibited 1: Allowed Setting modification (b7) 0: Prohibited 1: Allowed Communication rate (b8 to b11) 50 bps to 230400 bps For system (b12 to b14) All 0 Transmission specifications after switching (b15) designation 0: Match settings in GX Developer 1: Match settings in this area							
146 (92H)	306 (132H)	Signal setting	RS and DTR signal status designation 0: Off 1: On RS(RTS) signal (b0) ER(DTR) signal (b2) For system (b1), (b3) to (b15)	0005H	RW				Allowed	Section 3.2.1
147 (93H)	307 (133H)	For designation of transmission control	DTR/DSR(ER/DR), DC control designation • Transmission control (b0) 0: DTR/DSR control 1: DC code control • DC1/DC3 control (b8) 0: No control 1: Controlled • DC2/DC4 control (b9) 0: No control 1: Controlled	0	RW				Allowed	Section 9.4.5 User's Manual (Application)
148 (94H)	308 (134H)		DC1/DC3(Xon/Xoff) code designation • DC1 code (b0 to b7) 00H to FFH: DC1 code • DC3 code (b8 to b15) 00H to FFH: DC3 code	1311H						
149 (95H)	309 (135H)		DC2/DC4 code designation • DC2 code (b0 to b7) 00H to FFH: DC2 code • DC4 code (b8 to b15) 00H to FFH: DC4 code	1412H						
150 (96H)	310 (136H)	For designation of communication control	Word/byte units designation 0: Word units 1: Byte units	0	RW			—		Chapters 6 Chapter 7 Section 9.4.5
151 (97H)	311 (137H)		CD terminal check designation (for RS-232) 0: Check 1: No check	1	RW					Section 3.2.1 Section 9.4.5

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
152 (98H)	312 (138H)	For designation of communication control	Communication system designation (for RS-232) 0: Full duplex communication 1: Half-duplex communication	0	RW				Allowed	Chapter 7 Section 9.4.5 Section 9.4.8 User's Manual (Application)
153 (99H)	313 (139H)	For half- duplex communications control designation (RS-232)	Simultaneous transmission priority/non-priority designation 0: Priority 1 to 255: Non-priority (transmission wait time, unit: 100 ms)	0						
154 (9AH)	314 (13AH)		Retransmission time transmission method designation 0: Do not resend. 1: Resend.							
155 (9BH)	315 (13BH)	For designation of communication control	Simultaneously transmission data valid/invalid designation • Receive data valid/invalid (b0) 0: Valid 1: Invalid • Transmission data valid/invalid (b8) 0: Valid 1: Invalid		—	RW	—			
156 (9CH)	316 (13CH)	For designation of data communication time monitoring	No-reception monitoring time (timer 0) designation 0H : Wait infinitely 28H to FA0H: Monitoring time (unit: byte)	0H	RW			—	Allowed	Section 9.4.5 User's Manual (Application)
157 (9DH)	317 (13DH)		Response monitoring time (timer 1) designation 0H : Wait infinitely 1H to BB8H: Monitoring time (unit: 100 ms)	32H (5 s)	RW	—	RW	RW		
158 (9EH)	318 (13EH)		Transmission monitoring time (timer 2) designation 0H : Wait infinitely 1H to BB8H: Monitoring time (unit: 100 ms)	708H (3 min.)		RW		—		
159 (9FH)	319 (13FH)	Use prohibited	System area	—						
160 (A0H)	320 (140H)	For designation of on-demand function	Buffer memory head address designation (400H to 1AFFH, 2600H to 3FFFH)	CH1: 400H CH2: 800H	RW	—			Allowed	Section 9.4.6 Reference Manual
161 (A1H)	321 (141H)		Data length designation (0000H to 3400H)	0						
162 (A2H)	322 (142H)	For designation of transmission area	Transmission buffer memory head address designation (400H to 1AFFH, 2600H to 3FFFH)	CH1: 400H CH2: 800H	—	RW	RW	—		Chapter 6 Chapter 7 Section 9.4.5 Section 9.4.7 Section 9.7
163 (A3H)	323 (143H)		Transmission buffer memory length designation (0001H to 1A00H)	200H						
164 (A4H)	324 (144H)	For data reception	Received data count designation 0001H to 33FEH: Received data count	1FFH			—			
165 (A5H)	325 (145H)		Receive complete code designation FFFFH : No designation for receive complete code 0H to FFH: Receive complete code	0D0AH: (CR+LF)						
166 (A6H)	326 (146H)	For designation of reception area	Receive buffer memory head address designation (400H to 1AFFH, 2600H to 3FFFH)	CH1: 600H CH2: A00H			RW			
167 (A7H)	327 (147H)		Receive buffer memory length designation (0001H to 1A00H)	200H						
168 (A8H)	328 (148H)	For data reception	Receive data clear request 0: No request 1: Requested	0			—		Not allowed	
169 (A9H)	329 (149H)	For designation of on-demand user frame	First frame No. designation 1st 0: No designation Other than 0: Designated	0	RW	—	—		Allowed	Section 9.4.6 User's Manual (Application)
170 (AAH)	330 (14AH)		First frame No. designation 2nd 0: No designation Other than 0: Designated							
171 (ABH)	331 (14BH)		Last frame No. designation 1st 0: No designation Other than 0: Designated							
172 (ACH)	332 (14CH)		Last frame No. designation 2nd 0: No designation Other than 0: Designated							
173 (ADH)	333 (14DH)	For designation of receive user frame	User frame use enable/disable designation 0: Do not use 1: Use 2: Data communication possible (Q series C24 set)		—	RW				Section 9.4.7 User's Manual (Application)
174 to 177 (AEH to B1H)	334 to 337 (14EH to 151H)		First frame No. designation 1st (1st to 4th) 0H: No designation 1H or more: Head frame No.							

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
178 to 181 (B2H to B5H)	338 to 341 (152H to 155H)	For designation of receive user frame	Last frame No. designation (1st to 4th) 0H: No designation 1H or more: Last frame No. 0: No transmission designation 1 or more: Output frame No.	1: 0DH 2: 0AH 3: 0H 4: 0H	—	RW	—	—	Allowed	Section 9.4.7 Chapters 9 and 11 of User's Manual (Application)
182 (B6H)	342 (156H)	User frame being transmitted	User frame being transmitted 0 : Not send 1 to 100: User frame being transmitted (nth)	0		R			Not allowed	
183 (B7H)	343 (157H)	For user frame being transmitted designation	CR/LF output designation 0: Do not send. 1: Send.	0		RW			Allowed	
184 (B8H)	344 (158H)		Output head pointer designation 0: No designation 1 to 100: Send from nth							
185 (B9H)	345 (159H)		Output count designation 0: No designation 1 to 100: Output n							
186 to 285 (BAH to 11DH)	346 to 445 (15AH to 1BDH)		Output frame No. designation (A maximum of 100 can be specified) 0H: No transmission 1H to C01FH: Designated							
286 (11EH)	446 (1BEH)	For designation of transmission wait time	Message wait time designation 0: No wait time 1H to FH: Wait time (unit: 10 ms)	0	RW	—			Allowed	Section 9.4.6
287 (11FH)	447 (1BFH)	For designation of transparent code	Transmission transparent code designation 1st 0000H : No designation Other than 0000H: Designated (below) • Transparent code (b0 to b7) 00H to FFH: Transparent code • Additional code (b8 to b15) 01H to FFH: Additional code		—	RW	—			Section 9.4.5 User's Manual (Application)
288 (120H)	448 (1C0H)		Receive transparent code designation 0000H : No designation Other than 0000H: Designated (below) • Transparent code (b0 to b7) 00H to FFH: Transparent code • Additional code (b8 to b15) 01H to FFH: Additional code							
289 (121H)	449 (1C1H)	For conversion designation	ASCII-BIN conversion designation 0: No conversion 1: Convert							Section 9.4.5 User's Manual (Application)
290 (122H)	—	For communication control specification	System area	—						
—	450 (1C2H)		Echo back enable/disable setting for RS-422/485 interface 0: Enable echo back 1: Disable echo back	0	RW				Allowed	Section 3.3.4
291 to 303 (123H to 12FH)	451 to 511 (1C3H to 1EFH)	Use prohibited	System area	—						
512 (200H)		For confirmation of station No. setting status	Station No. (switch setting)	Depends on parameter setting	R				Not allowed	Section 4.3 Section 4.5.2 Section 9.6.10
513 (201H)		For confirmation of LED ON status and communication error status	LED ON status and communication error status on CH1 side 0: LED OFF, no error 1: LED ON, error SD WAIT (b0) C/N (b4) SIO (b1) NAK (b5) PRO. (b2) ACK. (b6) P/S (b3) NEU. (b7) For system (b8) to (b15)	Depends on module status						
514 (202H)			LED ON status and communication error status on CH2 side 0: LED OFF, no error 1: LED ON, error SD WAIT (b0) NAK (b5) SIO (b1) ACK. (b6) PRO. (b2) NEU. (b7) P/S (b3) CH2.ERR. (b14) C/N (b4) CH1 ERR. (b15) For system (b8) to (b13)							

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
515 (203H)		For confirmation of switch setting and mode switching	Switch setting error and mode switching error status 0: No error Other than 0: Switch setting error and mode switching error CH1 Communication protocol setting No. (b0) 0: Normal 1: Error CH1 Communication rate setting (b1) 0: Normal 1: Error CH1 Setting change prohibit time mode switching (b3) 0: Normal 1: Error CH2 Communication protocol setting No. (b4) 0: Normal 1: Error CH2 Communication rate setting (b5) 0: Normal 1: Error CH2 Setting change prohibit time mode switching (b7) 0: Normal 1: Error Setting station No. (b14) 0: Normal 1: Error Linked operation setting (b15) 0: Normal 1: Error	0	R				Not allowed	Section 4.3 Section 4.5.2 Section 9.6.10
516 (204H)		For confirmation of user frame	Number of registered user frames 0: No registration 1 to 200: Number of registered frames	Depends on registration status	R	—			Not allowed	Section 9.6.10
517 to 541 (205H to 21DH)			User frame registration status (for confirmation of registration No.) 0: No registration 1: Registered * Bit corresponding to registration No. is 0(OFF)/1(ON). Registration No.3E8H (1000) : Address 205H (b0) to Registration No. 4AFH (1199) : Address 211H (b7)							
542 (21EH)			Number of registered default registration frames (for system)							Section 9.6.10 User's Manual (Application)
543 (21FH)		Use prohibited	System area	—						
544 (220H)		For confirmation of flash ROM write result	Flash ROM system parameters write result 0 : Normal completion Other than 1 (error code) : Abnormal completion	0	RW				Not allowed	Section 9.6.10
545 (221H)		For confirmation of modem function	Modem function error code (error code when modem function is being used) 0 : Normal completion Other than 1 (error code) : Abnormal completion		RW		—		Not allowed	Section 9.6.2 User's Manual (Application)
546 (222H)			Modem function sequence status 0: Idle 8: Callback Request reception waiting 1: Waiting for initialization 2: Initializing modem 9: Callback Modem disconnect waiting 3: Waiting 4: Checking password 10: Callback Delay time waiting 5: Communicating 11: Callback Reconnecting 6: Notification in progress 12: Callback Rechecking password 7: Modem disconnected		R					
547 (223H)			Number of data registration for connection 0: No registration 1 to 30: Number of registrations	Depends on registration status						
548 to 549 (224H to 225H)			Data registration status for connection (for confirmation of registration No.) 0: No registration 1: Registered * Bit corresponding to registration No. is 0(OFF)/1(ON). Registration No. BB8H (3000) : Address 224H (b0) to Registration No. BD5H (3029) : Address 225H (b13)							
550 (226H)			Number of data registration for initialization 0: No registration 1 to 30: Number of registrations							

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
551 to 552 (227H to 228H)		For confirmation of modem function	Data registration status for initialization (for confirmation of registration No.) 0: No registration 1: Registered * Bit corresponding to registration No. is 0(OFF)/1(ON). Registration No.9C4H (2500) : Address 227H (b0) to Registration No. 9E1H (2529) : Address 228H (b13)	Depends on registration status	R			—	Not allowed	Section 9.6.2 Chapter 3 of User's Manual (Application)
553 (229H)		For confirmation of notification status	Number of notification execution 0: Not executed 1 or more: Number of executions	0						
554 (22AH)			Data storage area 1: Notification execution data No. 0 : Notification not executed BB8H to BD5H, 8001H to 801FH: Notification executed (notification execution No.)	0	R			—		
555 to 557 (22BH to 22DH)			Data storage area 1: System area (use prohibited)	—						
558 to 561 (22EH to 231H)			Data storage area 2	The configuration of each area is the same as the data storage area 1.						
562 to 565 (232H to 235H)			Data storage area 3							
566 to 569 (236H to 239H)			Data storage area 4							
570 to 573 (23AH to 23DH)			Data storage area 5							
574 to 590 (23EH to 24EH)		Use prohibited	System area	—						
591 (24FH)		For confirmation of station No. setting status	Station No. (instruction setting) (0 to 31)	Depends on module status	R				Not allowed	Section 4.5.2 Section 9.6.3 Section 11.1.6
592 (250H)	608 (260H)	For confirmation of transmission control status	Communication protocol status (switch setting) 0: GX Developer connection 5: MC protocol (format 5) 1: MC protocol (format 1) 6: Non procedure protocol 2: MC protocol (format 2) 7: Bidirectional protocol 3: MC protocol (format 3) 8: (For linked operation) 4: MC protocol (format 4) 9: Pre-defined protocol	Depends on parameter setting	R				Not allowed	Section 4.5.2 Section 9.6.3 Section 11.1.5
593 (251H)	609 (261H)		Transmission setting status (switch setting) Operation setting (b0) 0: Independent 1: Link Data bit (b1) 0: 7 bit 1: 8 bit Parity bit (b2) 0: No 1: Yes Odd/even parity (b3) 0: Odd 1: Even Stop bit (b4) 0: 1 bit 1: 2 bit Sum check code (b5) 0: No 1: Yes Write during RUN (b6) 0: Prohibited 1: Allowed Setting modification (b7) 0: Prohibited 1: Allowed Communication rate (b8 to b11) 50 bps to 230400 bps For system (b12 to b15) All 0							Section 4.5.2 Section 9.6.3 Section 11.1.6
594 (252H)	610 (262H)		Communication protocol status (current) 0: GX Developer connection 5: MC protocol (format 5) 1: MC protocol (format 1) 6: Non procedure protocol 2: MC protocol (format 2) 7: Bidirectional protocol 3: MC protocol (format 3) 8: (For linked operation) 4: MC protocol (format 4) 9: Pre-defined protocol	Depends on module status						
595 (253H)	611 (263H)		Transmission status (current) Operation setting (b0) 0: Independent 1: link Data bit (b1) 0: 7 bit 1: 8 bit Parity bit (b2) 0: No 1: Yes Odd/even parity (b3) 0: Odd 1: Even Stop bit (b4) 0: 1 bit 1: 2 bit Sum check code (b5) 0: No 1: Yes Write during RUN (b6) 0: Prohibited 1: Allowed Setting modification (b7) 0: Prohibited 1: Allowed Communication rate (b8 to b11) 50 bps to 230400 bps For system (b12 to b15) All 0							
596 (254H)	612 (264H)	Control signal status	RS-232 control signal status 0: OFF status 1: ON status RS(RTS) (b0) ER(DTR) (b2) CS(CTS) (b4) DR(DSR) (b1) CD(DCD) (b3) CI(RI) (b5) Not used (b6 to b15) All 0	Depends on signal status	R					Section 9.6.3 Section 11.1.3

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
597 (255H)	613 (265H)	For confirmation of communication result	Transmission sequence status (For confirmation of MC protocol communication status) 0: Waiting for receiving command 1: Receiving command 2: Command reception complete 3: Waiting to access programmable controller CPU 4: Accessing programmable controller CPU 5: Programmable controller CPU access complete 6: Response message transmission	0	R	—			Not allowed	Section 9.6.4 Section 11.1.4
598 (256H)	614 (266H)		On-demand execution result 0 : Normal completion 1 or more: Abnormal completion (error code)		RW	—				
599 (257H)	615 (267H)		Data transmission result 0 : Normal completion 1 or more: Abnormal completion (error code)		RW					Chapter 6 Chapter 7 Section 9.6.5 Section 9.6.6
600 (258H)	616 (268H)		Data reception result 0 : Normal completion 1 or more: Abnormal completion (error code)							
601 (259H)	617 (269H)		System area (Use prohibited)	—						
602 (25AH)	618 (26AH)		MC protocol transmission error code (excludes A compatible 1C frame communication) 0: No error 1 or more: Transmission error code	0	RW	—			Not allowed	Section 9.6.4
603 (25BH)	619 (26BH)		Receive user frame (nth) 0 : Not received 1 to 4: Combination of user frame No. designations for reception message		—	R	—			Section 9.6.5
604 to 607 (25CH to 25FH)	620 to 1023 (26CH to 3FFH)	Use prohibited	System area	—						
1024 (400H)	2048 (800H)	Transmission/ receive area	Transmission data count designation 0: No designation 1 or more: Number of send data	0	RW (＊2)				Not allowed	Chapter 6 Chapter 7 Section 9.4.5 Section 9.4.7
1025 to 1535 (401H to 5FFH)	2049 to 2559 (801H to 9FFH)		Transmission data designation Data to be sent to an external device							
1536 (600H)	2560 (A00H)		Receive data count (Number of data for which read is requested) 0: No receive data 1 or more: Number of receive data							
1537 to 2047 (601H to 7FFH)	2561 to 3071 (A01H to BFFH)		Receive data Data received from an external device							
3072 to 6911 (C00H to 1AFFH)		For user	User free area (3840 words) ＊ Determined by the user.	0	RW				Not allowed	—
6912 to 6952 (1B00H to 1B28H)		For user registration	For registration No. 8001H	The user registration area has the following combined uses, with data written by the user according to the purpose of use by the TO instruction, etc. See each explanation item concerning the configuration of each area, the data written, etc. (1) If data communications is being carried out by user registration frame. • User registration frame (User's Manual (Application)) (2) If data communications is being carried out by the modem function. • Initialization Data (User's Manual (Application)) • Connection Data (User's Manual (Application))					Not allowed	Refer to left description
6953 to 6993 (1B29H to 1B51H)			For registration No. 8002H							
6994 to 7034 (1B52H to 1B7AH)			For registration No. 8003H							
7035 to 7075 (1B7BH to 1BA3H)			For registration No. 8004H							
7076 to 7116 (1BA4H to 1BCCH)			For registration No. 8005H							
7117 to 7157 (1BCDH to 1BF5H)			For registration No. 8006H							
7158 to 7198 (1BF6H to 1C1EH)			For registration No. 8007H							
7199 to 7239 (1C1FH to 1C47H)			For registration No. 8008H							
7240 to 7280 (1C48H to 1C70H)			For registration No. 8009H							
7281 to 7321 (1C71H to 1C99H)			For registration No. 800AH							
7322 to 7362 (1C9AH to 1CC2H)			For registration No. 800BH							
7363 to 7403 (1CC3H to 1CEBH)			For registration No. 800CH							
7404 to 7444 (1CECH to 1D14H)			For registration No. 800DH							
7445 to 7485 (1D15H to 1D3DH)			For registration No. 800EH							

Address Decimal (Hex) CH1	CH2	Application	Name	Initial value	Protocol MC	Non	Bi	Pd	Registration	Reference section
7486 to 7526 (1D3EH to 1D66H)		For user registration	For registration No. 800FH	The user registration area has the following combined uses, with data written by the user according to the purpose of use by the TO instruction, etc. See each explanation item concerning the configuration of each area, the data written, etc. (1) If data communications is being carried out by user registration frame. • User registration frame (User's Manual (Application), Chapter 9) (2) If data communications is being carried out by the modem function. • Initialization Data (User's Manual (Application) Section 3.4.3) • Connection Data (User's Manual (Application) Section 3.4.4)					Not allowed	Refer to left description
7527 to 7567 (1D67H to 1D8FH)			For registration No. 8010H							
7568 to 7608 (1D90H to 1DB8H)			For registration No. 8011H							
7609 to 7649 (1DB9H to 1DE1H)			For registration No. 8012H							
7650 to 7690 (1DE2H to 1E0AH)			For registration No. 8013H							
7691 to 7731 (1E0BH to 1E33H)			For registration No. 8014H							
7732 to 7772 (1E34H to 1E5CH)			For registration No. 8015H							
7773 to 7813 (1E5DH to 1E85H)			For registration No. 8016H							
7814 to 7854 (1E86H to 1EAEH)			For registration No. 8017H							
7855 to 7895 (1EAFH to 1DE7H)			For registration No. 8018H							
7896 to 7936 (1ED8H to 1F00H)			For registration No. 8019H							
7937 to 7977 (1F01H to 1F29H)			For registration No. 801AH							
7978 to 8018 (1F2AH to 1F52H)			For registration No. 801BH							
8019 to 8059 (1F53H to 1F7BH)			For registration No. 801CH							
8060 to 8100 (1F7CH to 1FA4H)			For registration No. 801DH							
8101 to 8141 (1FA5H to 1FCDH)			For registration No. 801EH							
8142 to 8182 (1FCEH to 1FF6H)			For registration No. 801FH							
8183 to 8191 (1FF7H to 1FFFH)		Use prohibited	System area	—						
8192 (2000H)		System designation	Flash ROM write allow/prohibit designation 0: Write prohibited 1: Write allowed	0	RW				Not allowed	Section 9.4.13
8193 (2001H)		For callback function	Callback function designation 0H: Auto 1H: Callback connection (during fixed) ..... (Setting 4) 3H: Callback connection (during designated number) ..... (Setting 5) 7H: Callback connection (during max. designated number is 10) ..... (Setting 6) 9H: Auto/Callback connection (during fixed) ..... (Setting 1) BH: Auto/Callback connection (during designated number) ..... (Setting 2) FH: Auto/Callback connection (during max. designated number is 10) ..... (Setting 3)	0	RW	—			Allowed	Section 9.4.4 User's Manual (Application)
8194 (2002H)			Callback denial notification accumulated count designation 0H: Not specified 1H to FFFFH: Notification accumulated number count	1						
8195 to 8198 (2003H to 2006H)		Use prohibited	System area	—						
8199 (2007H)		For designation of modem function -2	Auto modem initialization designation 0: Do not auto initialize 1: Auto initialize	0	RW		—		Allowed	Section 9.4.4 User's Manual (Application)
8200 (2008H)			Modem initialization time DR (DSR) signal valid/invalid designation 0: Do not ignore DR(DSR) signal. 1: Ignore DR(DSR) signal.	1						
8201 (2009H)			Complete signal handling for modem function designation 0: Do not turn on/off X13 to X16. 1: Turn on/off X13 to X16.	1					Not allowed	
8202 (200AH)			Wait time of notification 0000H to FFFFH: Wait time (unit: s)	10					Allowed	
8203 (200BH)		Use prohibited	System area	—						
8204 (200CH)		For remote password function	Remote password mismatch notification count designation 0H: No designation 1H to FFFFH: Notification times	0	RW	—			Allowed	Section 5.1.5 Section 9.4.4 User's Manual (Application)
8205 (200DH)			Remote password mismatch notification accumulated count designation 0H: No designation 1H to FFFFH: Cumulative times of notification	1						

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
8206 (200EH)		For designation of modem function -3	Circuit disconnect wait time (programmable controller CPU watch use) 0000H to FFFFH: Wait time (unit: s)	0	RW		—		Allowed	Section 9.4.4 User's Manual (Application)
8207 (200FH)	8456 to 8463 (2108H to 210FH)	Use prohibited	System area	—						
8208 (2010H)	8464 (2110H)	Interrupt designation	Receive interrupt-issued designation 0: Do not issue interrupt. 1: Issue interrupt.	0	—	RW	—		Allowed	User's Manual (Application)
8209 (2011H)	8465 (2111H)	Use prohibited	System area	—						
8210 (2012H)	8466 (2112H)	For transmission control designation	Transmission control start free area designation 64 to 4,095: transmission control start free area	64	RW				Allowed	User's Manual (Application)
8211 (2013H)	8467 (2113H)		Transmission control end free area designation 263 to 4096: transmission control end free area	263						
8212 (2014H)	8468 (2114H)		Non procedure and non reception monitoring time format designation 0: Format-0 1: Format-1	0	—	RW	—			User's Manual (Application)
8213 to 8215 (2015H to 2017H)	8469 to 8471 (2115H to 2117H)	Use prohibited	System area	—						
8216 (2018H)	8472 (2118H)	Communication data monitoring function	Communication data monitoring designation 0000H: No monitor/stopped monitor designation 0001H: Monitor start designation 0002H: Monitoring (Q series C24 is a set.) 1002H: Monitoring stopped (Q series C24 is set.) 100FH: Monitor setting error (Q series C24 is a set.)	0	RW				Allowed	User's Manual (Application)
8217 (2019H)	8473 (2119H)		Data optional designation 0: Off 1: On Full stop designation (b0) Timer 0 errors at occurrence stop designation (b2) For system (b1), (b3) to (b15)	0						
8218 (201AH)	8474 (211AH)		Monitor buffer head address designation (400H to 1AFDH, 2600H to 3FFDH)	CH1: 2600H CH2: 3300H (＊3)						
8219 (201BH)	8475 (211BH)		Monitor buffer size designation (0003H to 1A00H)	0D00H						
8220 to 8223 (201CH to 201FH)	8476 to 8479 (211CH to 211FH)	Use prohibited	System area	—						
8224 to 8227 (2020H to 2023H)	8480 to 8483 (2120H to 2123H)	For designation of user frame receiving method	User frame receive format designation (1st to 4th) 0: Format-0, 1: Format-1	0	—	RW	—		Allowed	Section 9.4.7 User's Manual (Application)
8228 to 8231 (2024H to 2027H)	8484 to 8487 (2124H to 2127H)		Exclusive format-1 received data count (1st to 4th) 0 or more: Exclusive format-1 received data count							
8232 to 8239 (2028H to 202FH)	8488 to 8495 (2128H to 212FH)	Use prohibited	System area	—						
8240 to 8248 (2030H to 2038H)	8496 to 8504 (2130H to 2138H)	For designation of transparent code	Transmission transparent code designation (2nd to 10th) 0000H :No designation Other than 0000H :Designated (below) • Transparent code (b0 to b7) 00H to FFH : Transparent code • Additional code (b8 to b15) 01H to FFH : Additional code	0	—	RW	—		Allowed	Section 9.4.5 User's Manual (Application)
8249 to 8255 (2039H to 203FH)	8505 to 8511 (2139H to 213FH)	Use prohibited	System area	—						

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
8256 (2040H)	8512 (2140H)	For designation of programmable controller CPU monitoring function	Cycle time units designation 0: 100 ms 1: s 2: min	2	R		—		Allowed	User's Manual (Application)
8257 (2041H)	8513 (2141H)		Cycle time designation 0H : No designation 1H to FFFFH: Programmable controller CPU monitoring cycle time	5H						
8258 (2042H)	8514 (2142H)		Programmable controller CPU monitoring function designation 0: Do not use the function. 1: Fixed cycle transmission 2: Condition agreement transmission	0						
8259 (2043H)	8515 (2143H)		Programmable controller CPU monitoring transmission measure designation 0: Data transmission (device data and CPU status data) 1: Notification	0						
8260 (2044H)	8516 (2144H)		Transmission pointer designation (For fixed cycle transmission and non-procedure data transmission) 0: No designation 1 to 100: Output head point (send from the nth) * Send the user frames designated in the following transmission frame No. designation areas from the designated pointer position. (addresses: CH1 side = BAH to 11DH, CH2 side = 15AH to 1BDH)		—	R				
8261 (2045H)	8517 (2145H)		Output count designation (for fixed cycle transmission and non-procedure data transmission) 0: No designation 1 to 100: Output count (designate the number of frame transmissions.)							
8262 (2046H)	8518 (2146H)		Data No. for connection designation (for fixed cycle transmission and notification) 0: No designation 0BB8H to 0BD5H, 8001H to 801FH: Data No. for connection		R					
8263 to 8268 (2047H to 204CH)	8519 to 8524 (2147H to 2149H)	Use prohibited	System area	—						
8269 (204DH)	8225 (214DH)	For designation of programmable controller CPU monitoring function	Number of registered word blocks designation 0 : No designation 1 to 10: Number of blocks of word devices It is possible to designate a maximum of 10 blocks in total.	0	R		—		Allowed	User's Manual (Application)
8270 (204EH)	8226 (214EH)		Number of registered bit blocks designation 0 : No designation 1 to 10: Number of blocks of bit devices							
8271 (204FH)	8527 (214FH)		Programmable controller CPU abnormal monitoring designation 0: Do not monitor. 1: Monitor.							
8272 (2050H)	8528 (2150H)		No. 1 block monitoring device: Monitoring device designation 0: No designation 90H to CCH: Device code							
8273 to 8274 (2051H to 2052H)	8529 to 8530 (2151H to 2152H)		Head device No. designation 0 or more: Head device No.							
8275 (2053H)	8531 (2153H)		Read point designation 0: No designation 1 or more: Number to read points							
8276 (2054H)	8532 (2154H)		Monitoring condition designation (judgment condition designation) 0: No designation 1 or more: Monitoring condition							
8277 (2055H)	8533 (2155H)		Monitoring condition value designation At bit device 0: OFF 1: ON At word device 0 to FFFFH: Monitoring condition value							
8278 (2056H)	8534 (2156H)		Transmission pointer designation (for condition agreement transmission and non-procedure data transmission) 0: No designation 1 to 100: Output head point (send from nth) * Send the user frames designated in the following transmission frame No. designation areas from the designated pointer position. (address: CH1 side = BAH to 11DH, CH2 side = 15AH to 1BDH)		—	R				
8279 (2057H)	8535 (2157H)		Output count designation (for condition agreement transmission and non-procedure data transmission) 1 to 100: Output count (designate the number of frame transmissions)							
8280 (2058H)	8536 (2158H)		Data No. for connection designation (for condition agreement transmission and notification) 0BB8H to 0BD5H, 8001H to 801FH: Data No. for connection		R					

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name		Initial value	Applicable protocol MC	Non	Bi	Pd	Registration	Reference section
8281 to 8361 (2059H to 20A9H)	8537 to 8617 (2159H to 21A9H)	For designation of programmable controller CPU monitoring function	Block monitoring devices No. 2 to 10	The structure of each area is the same as the first block monitoring device area. See *1 for the details of each area.						Allowed	User's Manual (Application)
8362 to 8421 (20AAH to 20E5H)	8618 to 8677 (21AAH to 21E5H)	Use prohibited	System area							—	
8422 (20E6H)	8678 (21E6H)	For designation of programmable controller CPU monitoring function	Programmable controller CPU abnormal monitoring designation	Transmission pointer designation (for condition agreement transmission and non-procedure data transmission) 0: No designation 1 to 100: Output head point (send from nth) * Send the user frames designated in the following transmission frame No. designation areas from the designated pointer position. (address: CH1 side = BAH to 11DH, CH2 side = 15AH to 1BDH)	0	—	R	—	Allowed	User's Manual (Application)
8423 (20E7H)	8679 (21E7H)			Output count designation (for condition agreement transmission and non-procedure data transmission) 0: No designation 1 to 100: Output count (designate the number of frame transmissions)						
8424 (20E8H)	8680 (21E8H)			Data No. for connection designation (for condition agreement transmission and notification) 0: No designation 0BB8H to 0BD5H, 8001H to 801FH: Data No. for connection		R				
8425 to 8447 (20E9H to 20FFH)	8681 to 8703 (21E9H to 21FFH)	Use prohibited	System area							—	
8448 (2100H)		Use Prohibited	System area							—	
8449 (2101H)		For callback function	Data No. for callback designation 1 0BB8H to 0BD5H, 8001H to 801FH: Data number for callback.		0	R W	—		Allowed	Section 9.4.4 User's Manual (Application)
8450 (2102H)			Data No. for callback designation 2							
8451 (2103H)			Data No. for callback designation 3							
8452 (2104H)			Data No. for callback designation 4							
8453 (2105H)			Data No. for callback designation 5							
8454 (2106H)			Data No. for callback designation 6							
8455 (2107H)			Data No. for callback designation 7							
8456 (2108H)			Data No. for callback designation 8							
8457 (2109H)			Data No. for callback designation 9							
8458 (210AH)			Data No. for callback designation 10							
8704 to 8707 (2200H to 2203H)	8960 to 8963 (2300H to 2303H)	Use prohibited	System area							—	
8708 (2204H)	8964 (2304H)	Programmable controller CPU monitoring function	Programmable controller CPU monitoring function operation status 0: Not executed (waiting for registration of programmable controller CPU monitoring) 1: Wait for programmable controller CPU monitoring time (waiting to access programmable controller CPU) 2: Accessing programmable controller CPU 3: Sending monitoring results		0	R	—		Not allowed	User's Manual (Application)
8709 (2205H)	8965 (2305H)		Programmable controller CPU monitoring function execution result (current) 0: Normal completion 1 or more: Abnormal completion (error code)							
8710 (2206H)	8966 (2306H)		Programmable controller CPU monitoring function number of transmission 0: Not executed 1 or more: Number of transmissions							

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
8711 (2207H)	8967 (2307H)	Programmable controller CPU monitoring function	Monitoring condition arrival block No. 0 : The monitoring condition is not enabled for any block 1 to 10: Registration order of word/bit block (nth) 4096 : CPU abnormal monitoring block * The latest block No. for which monitoring condition is enabled is stored.	0	R	—			Not allowed	User's Manual (Application)
8712 to 8943 (2208H to 22EFH)	8968 to 9215 (2308H to 23FFH)	Use prohibited	System area	—						
8944 (22F0H)		For callback function	Callback permit accumulated count 0 or more: Accumulated count	0	RW	—			Not allowed	Section 9.6.2 User's Manual (Application)
8945 (22F1H)			Callback denial accumulated count 0 or more: Accumulated count							
8946 (22F2H)			Auto (callback) connection permit accumulated count 0 or more: Accumulated count							
8947 (22F3H)			Auto (callback) connection denial accumulated count 0 or more: Accumulated count							
8948 (22F4H)			Accumulated count of callback receive procedure cancel 0 or more: Accumulated count							
8949 to 8954 (22F5H to 22FAH)		Use prohibited	System area	—						
8955 (22FBH)		For the remote password function	Accumulated count of unlock process normal completion 0 or more: Accumulated count of normal completion	0	RW	—			Not allowed	Section 5.1.5 Section 9.6.2 User's Manual (Application)
8956(22FCH)			Accumulated count of unlock process abnormal completion processing 0 or more: Accumulated count of abnormal completion							
8957 to 8958 (22FDH to 22FEH)		Use prohibited	System area	—						
8959(22FFH)		For the remote password function	Accumulated count of lock process based on circuit disconnection 0 or more: Accumulated count of lock process based on circuit disconnection	0	RW	—			Not allowed	Section 5.1.5 Section 9.6.2 User's Manual (Application)
9216(2400H)		Use prohibited	System area	—						
9217(2401H)		For flash ROM write count housing	Flash ROM write count 0 to 1000: Write count	0	R				Not allowed	—
9218 to 9427 (2402H to 25FFH)		Use prohibited	System area	—						
9728 to 16383 (2600H to 3FFFH)		For user	User free area 2 (6656 words) (Transmission/receiving data monitoring function default buffer) * Usage is determined by the user.	0	RW				Not allowed	—
16384 to 16415 (4000H to 401FH)	16416 to 16447 (4020H to 403FH)	Use prohibited	System area	—						
16448 (4040H)	16464 (4050H)	Pre-defined protocol function control data specification	Protocol cancel 0: No cancel instruction 1: Cancel request (set by user) 2: Cancel completed (set by Q series C24N)	0	—			RW	Not allowed	Section 8.1.3, Operating Manual (Pre-defined protocol support function)

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name	Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
16449 (4041H)	16465 (4051H)	Checking pre-defined protocol function execution status	Execution status 0: Unexecuted 1: Waiting for transmission 2: Sending 3: Waiting for data reception 4: Receiving 5: Completed	0	—			R	Not allowed	Section 8.1.4
16450 (4042H)	16466 (4052H)		Pre-defined protocol function error code 0: Normal Other than 0: Error (error code)	0	—			R		Section 11.2
16451 (4043H)	16467 (4053H)		Number of protocol executions 0: No log 1 to 65535: Number of executions	0	—			R		Section 8.1.3
16452 to 16463 (4044H to 404FH)	16468 to 16479 (4054H to 405FH)	Use prohibited	System area	—						
16480 to 16517 (4060H to 4085H)		Use prohibited	System area	—						
16518(4086H)		Protocol setting data error information	Protocol No. 1 to 128: Protocol No. 65535: Unidentified	0	—			R	Not allowed	Section 11.2.1
16519(4087H)			Setting type 0: Packet setting or element setting 1: Protocol detailed setting 65535: Not specified	0	—			R		
16520(4088H)			Packet No. 0: Send packet 1 to 16: Receive packet 65535: Unidentified * Valid when the Setting type value is 0.	0	—			R		
16521(4089H)			Element No. 1 to 32: Element No. 65535: Unidentified * Valid when the Setting type value is 0.	0	—			R		
16522 to 16527 (408AH to 408FH)		Use prohibited	System area	—						
16528 (4090H)		Checking protocol setting data	Number of registered protocols 0: No registration 1 to 128: Number of registrations	0	—			R	Not allowed	Chapter 8
16529 to 16536 (4091H to 4098H)			Protocol registration 0: Not registered 1: Registered * The bit corresponding to each protocol No. turns on or off. Each bit indicates the corresponding protocol No. b15 b14 b13 … b2 b1 b0 4091H: 16 15 14 … 3 2 1 4092H: 32 31 30 … 19 18 17 4093H: 48 47 46 … 35 34 33 4094H: 64 63 62 … 51 50 49 4095H: 80 79 78 … 67 66 65 4096H: 96 95 94 … 83 82 81 4097H: 112 111 110 … 99 98 97 (0: Not registered) 4098H: 128 127 126 … 115 114 113 (1: Registered)	0	—			R		—
16537 to 16607 (4099H to 40DFH)		Use prohibited	System area	—						
16608 to 16609 (40E0H to 40E1H)	16624 to 16625 (40F0H to 40F1H)	Use prohibited	System area	—						
16610 (40E2H)	16626 (40F2H)	Protocol execution log specification	Execution log options 0: Error logs of failed protocol executions are stored. 1: Execution states and logs of all protocols are stored.	0	—			RW	Allowed	Section 8.1.4

Address Decimal (Hex)		Application	Name		Initial value	Protocol				Registration	Reference section
CH1	CH2					MC	Non	Bi	Pd		
16611 to 16623 (40E3H to 40EFH)	16627 to 16639 (40F3H to 40FFH)	Use prohibited	System area		—						
16640 (4100H)	18432 (4800H)	Checking protocol execution logs	Number of stored protocol execution logs 0: No log 1 to 32: Number of stored logs		0	—		R	Not allowed	Section 8.1.4	
16641 (4101H)	18433 (4801H)		Protocol execution log write pointer 0: No log 1 to 32: Latest protocol execution log No.		0	—		R			
16642 (4102H)	18434 (4802H)		Execution log 1	System area (use prohibited)	—						
16643 (4103 H)	18435 (4803H)			Protocol No. 0: No log 1 to 128: Protocol No. 201 to 207: Functional protocol No.	0	—		R	Not allowed	Section 8.1.4, Operating Manual (Pre-defined protocol support function)	
16643 to 16659 (4104H to 4113H)	18436 to 18451 (4804H to 4813H)			External device model 0: Protocol unexecuted Other than 0: External device model (Up to 32 bytes are stored in ASCII codes.)	0	—		R			

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name		Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
16660 to 16675 (4114H to 4123H)	18452 to 18467 (4814H to 4823H)	Checking protocol execution log	Execution log 1	Protocol name 0: No protocol executed Other than 0: Protocol name (Up to 32 bytes in ASCII codes are stored.)	0	—			R	Not allowed	Section 8.1.4, Operating Manual (Pre-defined protocol support function), Section
16676 (4124H)	18468 (4824H)			Communication type 0: Protocol unexecuted 1: Send only 2: Receive only 3: Send and receive 14: Functional protocol 15: Unregistered protocol	0	—			R		
16677 (4125H)	18469 (4825H)			Execution status 0: Unexecuted 1: Waiting for transmission 2: Sending 3: Waiting for reception 4: Receiving 5: Completed	0	—			R	Not allowed	
16678 (4126H)	18470 (4826H)			Execution result 0: Normal Other than 0 (error code): Error	0	—			R		
16679 (4127H)	18471 (4827H)			Matched packet No. 0: Error occurred, or Communication type of the executed protocol is “Send only”. 1 to 16: Matched packet No.	0	—			R	Not allowed	
16680 (4128H)	18472 (4828H)			Number of retries 0: No retry 1 to 10: Number of retries	0	—			R		
16681 (4129H)	18473 (4829H)			System area (Use prohibited)	—						
16682 (412AH)	18474 (482AH)		Start time and date	0: No log Upper 8 bits: Month Lower 8 bits: Last 2 digits of year b15 to b8 b7 to b0 Month (01H to 12H) | Year (00H to 99H), last 2 digits	0	—			R	Not allowed	Section 8.1.4 Operating Manual (Pre-defined protocol support function
16683 (412BH)	18475 (482BH)			0: No log Upper 8 bits: Hour Lower 8 bits: Day b15 to b8 b7 to b0 Hour (00H to 23H) | Day (01H to 31H)	0	—			R		
16684 (412CH)	18476 (482CH)			0: No log Upper 8 bits: Second Lower 8 bits: Minute b15 b8 b7 b0 Second (00H to 59H) | Minute (00H to 59H)	0	—			R		
16685 (412DH)	18477 (482DH)			0: No log Lower 8 bits: First 2 digits of year Lower 8 bits: Day of week b15 to b8 b7 to b0 Year (00H to 99H), first 2 digits | Day of week (00H to 06H) 00H (Sunday) to 06H (Saturday)	0	—			R		
16686 (412EH)	18478 (482EH)		End time and date	0: No log Upper 8 bits: Month Lower 8 bits: Last 2 digits of year b15 to b8 b7 to b0 Month (01H to 12H) | Year (00H to 99H), last 2 digits	0	—			R		
16687 (412FH)	18479 (482FH)			0: No log Upper 8 bits: Hour Lower 8 bits: Day b15 to b8 b7 to b0 Hour (00H to 23H) | Day (01H to 31H)	0	—			R		

Address Decimal (Hex) CH1	Address Decimal (Hex) CH2	Application	Name			Initial value	Protocol MC	Protocol Non	Protocol Bi	Protocol Pd	Registration	Reference section
16688 (4130H)	18480 (4830H)	Checking protocol execution logs	Execution log 1	End time and date	0: No log Upper 8 bits: Second Lower 8 bits: Minute b15 to b8 b7 to b0 Second (00H to 59H) | Minute (00H to 59H)	0	—			R	Not allowed	Section 8.1.4, Operating Manual (Pre-defined protocol support function)
16689 (4131H)	18481 (4831H)				0: No log Lower 8 bits: First 2 digits of year Lower 8 bits: Day of week b15 to b8 b7 to b0 Year (00H to 99H), first 2 digits | Day of week (00H to 06H) 00H (Sunday) to 06H (Saturday)	0	—			R		
16690 to 18177 (4132H to 4701H)	18482 to 19969 (4832H to 4E01H)		Execution log 2 to 32	Same as Execution log 1		0	—			R		
18178 to 18429 (4702H to 47FDH)	19970 to 20223 (4E02H to 4EFFH)	Use prohibited	System area			—						
20224 to 20479 (4F00H to 4FFFH)												
20480 to 24575 (5000H to 5FFFH)		Send/receive area for pre-defined protocol function	Pre-defined protocol function buffer			0	—			RW	Not allowed	Operating Manual (Pre-defined protocol support function)
24576 to 32767 (6000H to 7FFFH)		Use prohibited	System area			—						

∗1 Tables (a) and (b) on the following page list the assignment of block monitoring device areas No. 1 to No.10 for the programmable controller CPU monitoring function (CH1 side: 8272 to 8361 (2050H to 20A9H), CH2 side: 8528 to 8617 (2150H to 21A9H)).

∗2 In the pre-defined protocol mode, the area can be used as a user setting area (the send and receive data storage areas).

∗3 For the QJ71C24(-R2), the initial value of 0H is set for both CH1 and CH2.

(a) [CH1 side buffer memory address: decimal (hexadecimal)]

N-th block monitoring device										Name
1	2	3	4	5	6	7	8	9	10	
8272 (2050H)	8281 (2059H)	8290 (2062H)	8299 (206BH)	8308 (2074H)	8317 (207DH)	8326 (2086H)	8335 (208FH)	8344 (2098H)	8353 (20A1H)	Monitoring device designation
8273 to 8274 (2051H to 2052H)	8282 to 8283 (205AH to 205BH)	8291 to 8292 (2063H to 2064H)	8300 to 8301 (206CH to 206DH)	8309 to 8310 (2075H to 2076H)	8318 to 8319 (207EH to 207FH)	8327 to 8328 (2087H to 2088H)	8336 to 8337 (2090H to 2091H)	8345 to 8346 (2099H to 209AH)	8354 to 8355 (20A2H to 20A3H)	Head device No. designation
8275 (2053H)	8284 (205CH)	8293 (2065H)	8302 (206EH)	8311 (2077H)	8320 (2080H)	8329 (2089H)	8338 (2092H)	8347 (209BH)	8356 (20A4H)	Designation of number of points read
8376 (2054H)	8385 (205DH)	8294 (2066H)	8303 (206FH)	8312 (2078H)	8321 (2081H)	8330 (208AH)	8339 (2093H)	8348 (209CH)	8357 (20A5H)	Monitoring condition designation (Judgment condition designation)
8277 (2055H)	8286 (205EH)	8295 (2067H)	8304 (2070H)	8313 (2079H)	8322 (2082H)	8331 (208BH)	8340 (2094H)	8349 (209DH)	8358 (20A6H)	Monitoring condition value designation
8278 (2056H)	8287 (205FH)	8296 (2068H)	8305 (2071H)	8314 (207AH)	8323 (2083H)	8332 (208CH)	8341 (2095H)	8350 (209EH)	8359 (20A7H)	Transmission pointer designation (for conditional transmission, data transmission)
8279 (2057H)	8288 (2060H)	8297 (2069H)	8306 (2072H)	8315 (207BH)	8324 (2084H)	8333 (208DH)	8342 (2096H)	8351 (209FH)	8360 (20A8H)	Designation of number of outputs (for conditional transmission, data transmission)
8280 (2058H)	8289 (2061H)	8298 (206AH)	8307 (2073H)	8316 (207CH)	8325 (2085H)	8334 (208EH)	8343 (2097H)	8352 (20A0H)	8361 (20A9H)	Designation of data No. for connection (for conditional transmission and notification)

(b) [CH2 side buffer memory address: decimal (hexadecimal)]

N-th block monitoring device										Name
1	2	3	4	5	6	7	8	9	10	
8528 (2150H)	8537 (2159H)	8546 (2162H)	8555 (216BH)	8564 (2174H)	8573 (217DH)	8582 (2186H)	8591 (218FH)	8600 (2198H)	8609 (21A1H)	Monitoring device designation
8529 to 8530 (2151H to 2152H)	8538 to 8539 (215AH to 215BH)	8547 to 8548 (2163H to 2164H)	8556 to 8557 (216CH to 216DH)	8565 to 8566 (2175H to 2176H)	8574 to 8575 (217EH to 217FH)	8583 to 8584 (2187H to 2188H)	8592 to 8593 (2190H to 2191H)	8601 to 8602 (2199H to 219AH)	8610 to 8611 (21A2H to 21A3H)	Head device No. designation
8531 (2153H)	8540 (215CH)	8549 (2165H)	8558 (216EH)	8567 (2177H)	8576 (2180H)	8585 (2189H)	8594 (2192H)	8603 (219BH)	8612 (21A4H)	Designation of number of points read
8532 (2154H)	8541 (215DH)	8550 (2166H)	8559 (216FH)	8568 (2178H)	8577 (2181H)	8586 (218AH)	8595 (2193H)	8604 (219CH)	8613 (21A5H)	Monitoring condition designation (Judgment condition designation)
8533 (2155H)	8542 (215EH)	8551 (2167H)	8560 (2170H)	8569 (2179H)	8578 (2182H)	8587 (218BH)	8596 (2194H)	8605 (219DH)	8614 (21A6H)	Monitoring condition value designation
8534 (2156H)	8543 (215FH)	8552 (2168H)	8561 (2171H)	8570 (217AH)	8579 (2183H)	8588 (218CH)	8597 (2195H)	8606 (219EH)	8615 (21A7H)	Transmission pointer designation (for conditional transmission, data transmission)
8535 (2157H)	8544 (2160H)	8553 (2169H)	8562 (2172H)	8571 (217BH)	8580 (2184H)	8589 (218DH)	8598 (2196H)	8607 (219FH)	8616 (21A8H)	Designation of number of outputs (for conditional transmission, data transmission)
8536 (2158H)	8545 (2161H)	8554 (216AH)	8563 (2173H)	8572 (217CH)	8581 (2185H)	8590 (218EH)	8599 (2197H)	8608 (21A0H)	8617 (21A9H)	Designation of data No. for connection (for conditional transmission and notification)

MEMO

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4 SETTINGS AND PROCEDURES PRIOR TO OPERATION

This chapter explains the settings and procedures required before starting a system that uses the Q series C24.

POINT

(1) When using the Q series C24, please read the safety precautions at the beginning of this manual.
(2) The installation and setup methods of the Q series C24 are the same as those for CPU modules.
(3) For module installation and setup, see the user's manual for the programmable controller CPU used.

4.1 Handling Precautions

The following explains the precautions for handling the Q series C24:

(1) Do not drop the module or subject it to heavy impact since it is made of resin.

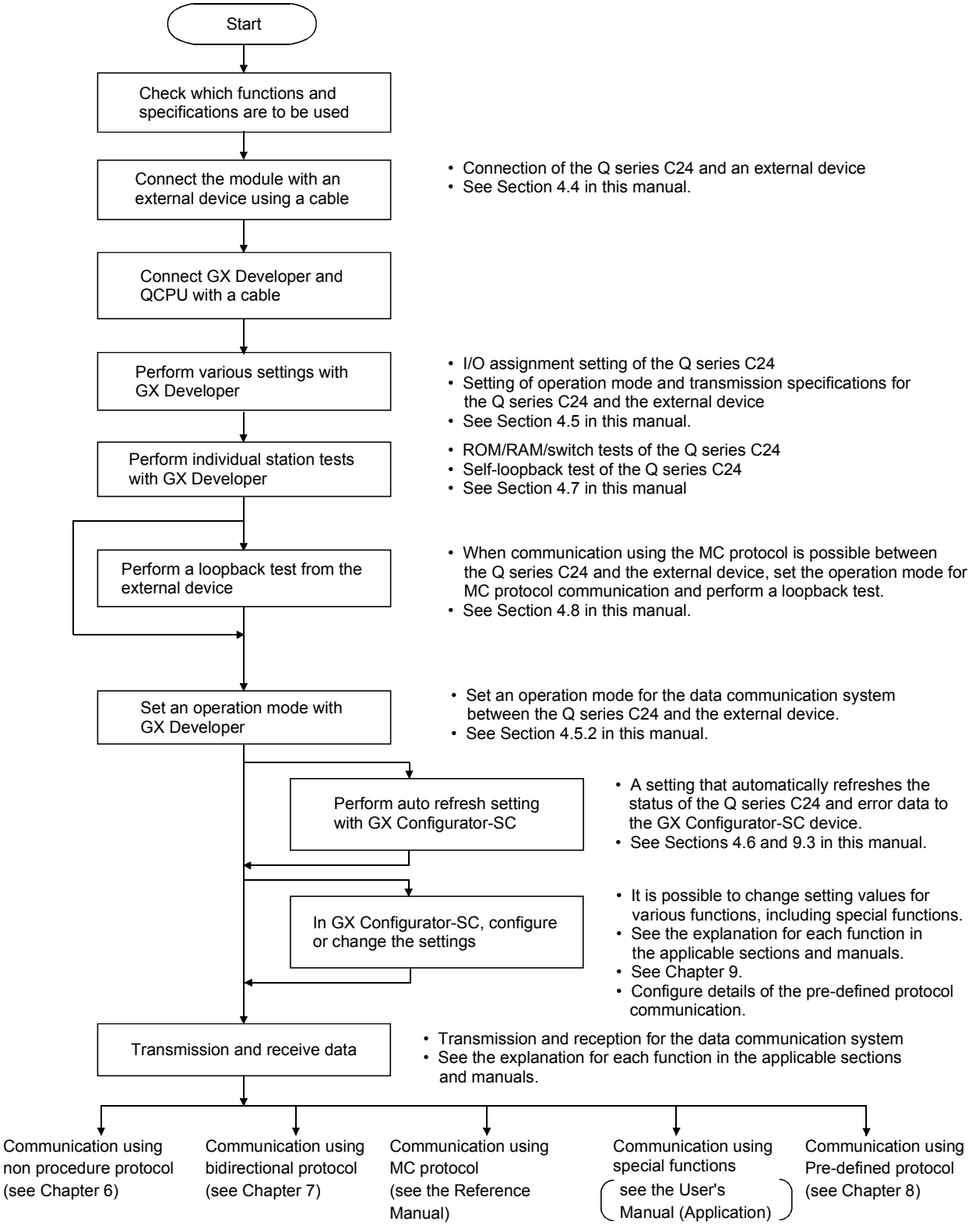
(2) Tighten the screws such as module fixing screws within the following ranges.

Screw location	Tightening torque range	Remarks
RS-422/485 terminal block terminal screw (M3 screw)	0.42 to 0.58 N · m	-
RS-422/485 plug-in connector socket terminal screw for QJ71C24N-R4 (M2 screw)	0.20 to 0.25 N · m	-
RS-232 cable connector screw (M2.6 screw)	0.20 to 0.39 N · m	Screw hole depth: L=3.2mm or less (Internal length from the surface)
Module fixing screw (normally not required) (M3 screw) (＊1)	0.36 to 0.48 N · m	-

＊1 The module can be easily fixed onto the base unit using the hook at the top of the module.
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

4.2 Settings and Procedures Prior to Operation

Below is an outline of the procedure before operation.

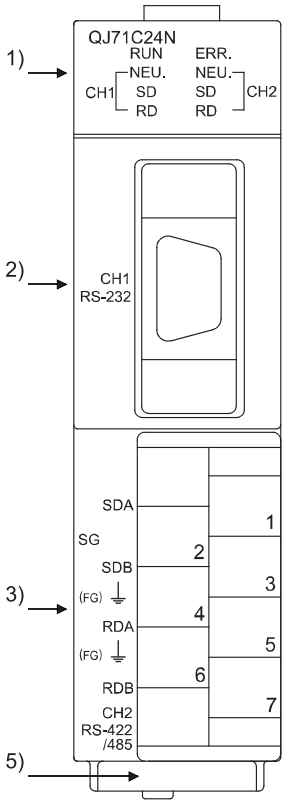

Start
Check which functions and specifications are to be used
Connect the module with an external device using a cable
• Connection of the Q series C24 and an external device
• See Section 4.4 in this manual.
Connect GX Developer and QCPU with a cable
Perform various settings with GX Developer
• I/O assignment setting of the Q series C24
• Setting of operation mode and transmission specifications for the Q series C24 and the external device
• See Section 4.5 in this manual.
Perform individual station tests with GX Developer
• ROM/RAM/switch tests of the Q series C24
• Self-loopback test of the Q series C24
• See Section 4.7 in this manual
Perform a loopback test from the external device
• When communication using the MC protocol is possible between the Q series C24 and the external device, set the operation mode for MC protocol communication and perform a loopback test.
• See Section 4.8 in this manual.
Set an operation mode with GX Developer
• Set an operation mode for the data communication system between the Q series C24 and the external device.
• See Section 4.5.2 in this manual.
Perform auto refresh setting with GX Configurator-SC
• A setting that automatically refreshes the status of the Q series C24 and error data to the GX Configurator-SC device.
• See Sections 4.6 and 9.3 in this manual.
In GX Configurator-SC, configure or change the settings
• It is possible to change setting values for various functions, including special functions.
• See the explanation for each function in the applicable sections and manuals.
• See Chapter 9.
• Configure details of the pre-defined protocol communication.
Transmission and receive data
• Transmission and reception for the data communication system
• See the explanation for each function in the applicable sections and manuals.
Communication using non procedure protocol (see Chapter 6)
Communication using bidirectional protocol (see Chapter 7)
Communication using MC protocol (see the Reference Manual)
Communication using special functions (see the User's Manual (Application))
Communication using Pre-defined protocol (see Chapter 8)

4 - 2

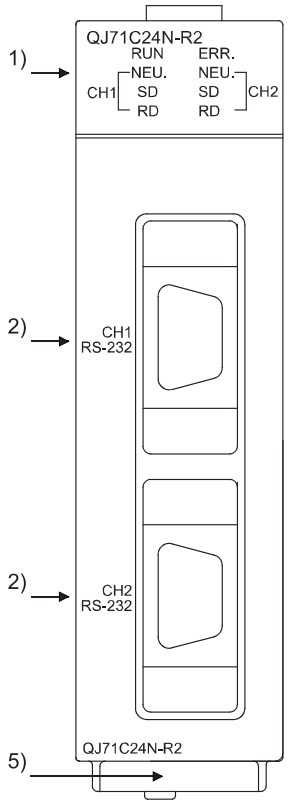
4.3 Part Names and Functions

Part names of Q series C24 are shown below.

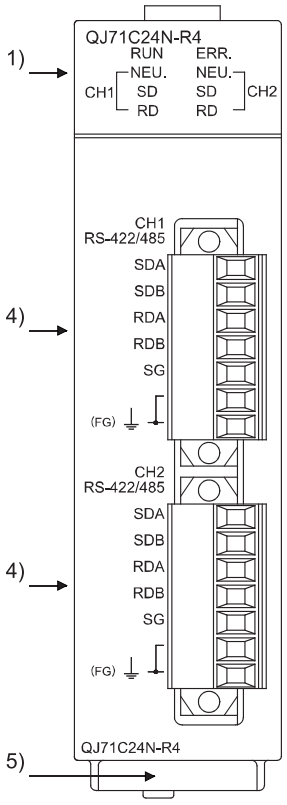
QJ71C24N
QJ71C24 (*1)



QJ71C24N-R2
QJ71C24-R2 (*2)



QJ71C24N-R4

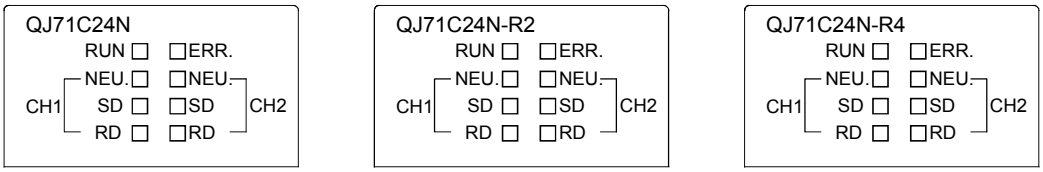


*1 The appearance of the QJ71C24 is almost the same as that of the QJ71C24N, except for the model name part and serial number plate.

*2 The appearance of the QJ71C24-R2 is almost the same as that of the QJ71C24N-R2, except for the model name part and serial number plate.

	Name	Contents
1)	Display LED	Display LED (For details, see (1).)
2)	RS-232 interface	RS232 interface for serial communication with external devices (D-Sub 9 pin)
3)	RS-422/485 interface	RS422/485 interface for serial communication with external devices (2-piece terminal block)
4)	RS-422/485 interface	RS422/485 interface for serial communication with external devices (2-piece plug-in socket block)
5)	Serial number plate	Indicates the serial No. of the serial communication module.

(1) LED display list



CH	LED	Display contents	On/flashing	Off	Compatible protocol			
					MC	Non-procedural	Bidirectional	Pre-defined
—	RUN	Normal operation display	Normal	Faulty or reset	Valid			
	ERR	Error display (＊1)	Error has occurred	Normal				
CH1	NEU (＊3)	Neutral status on the CH1 side display (＊2)	Waiting for MC command message to be received	MC command message being received	Valid	Invalid (Off)		
	SD	Transmission status display	Data being transmitted	Data not transmitted	Valid			
	RD	Reception status display	Data being received	Data not received				
CH2	NEU (＊3)	Neutral status on the CH2 side display (＊2)	Waiting for MC command message to be received	MC command message being received	Valid	Invalid (Off)		
	SD	Transmission status display	Data being transmitted	MC command message not transmitted	Valid			
	RD	Reception status display	Data being received	MC command message not received				

＊1 This LED comes on when an error occurs at Q series C24 hardware or during data communication.
＊2 This LED displays the data communication status via MC protocol. (See chapter 11.)
On: Waiting for the command message to be received from the external device.
Off: Processing the command message received from the external device.
＊3 This LED can be made valid also when "GX Developer connection" (0H) is specified in communication protocol setting.

4.4 External Wiring

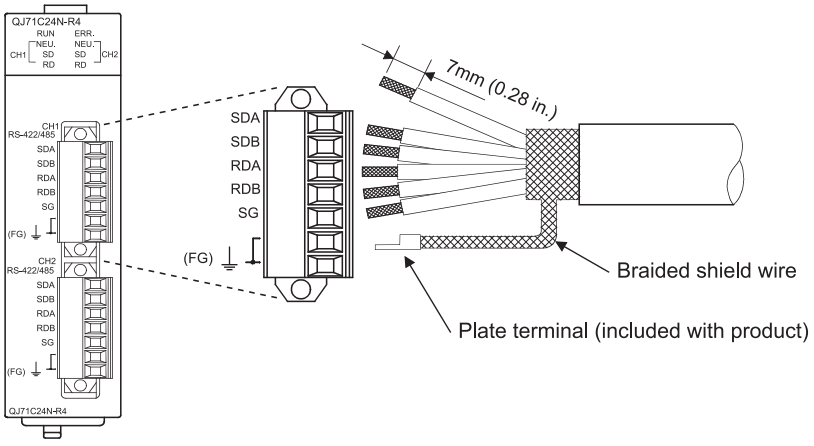
This section explains wiring between the Q series C24 and external device.

As the wiring precautions, external wiring which is resistant to the effects of external noise is a prerequisite for reliable system operation and full use of the Q series C24 function.

(1) Ground the shield at only one point.

(2) When connecting with an external device using an RS-232 line, use a connector shell as specified in Section 3.2.1 on the Q series C24 end.

(3) When connecting with an external device using an RS-422/485 cable, be sure to note the following.
   (a) QJ71C24N and QJ71C24
      1) Use the RS-422/485 cable recommended in section 3.3.2.
      2) The RS-422/485 interface terminal block uses M3 terminal screws. Use suitable crimp-on terminals for the terminals.
   (b) QJ71C24N-R4
      1) Use the RS-422/485 cable recommended in section 3.3.2. Be sure to strip the outer insulation layer by 7 mm before connecting the cable to the plug-in socket block.
      2) When connecting the braided shield wire inside the RS-422/485 cable, use the plate terminals included with the product. The braided shield wire can be connected without the plate terminal. Four plate terminals are included to connect the FG terminals of both stations. (See section 4.4.2.(6).)
      3) When connecting the plug-in socket block to the QJ71C24N-R4, be sure to confirm the layout of the socket block, and then insert it into the RS-422/485 connector on the QJ71C24N-R4.



(4) Connect the external device according to its specifications.

(5) See Appendix 5 for the bend radius of the connection cable.

(6) Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them.

4.4.1 Connecting the RS-232 interface (full-duplex communications)

The following shows the connection precautions and connection examples when using the Q series C24 RS-232 interface for full-duplex communications.

(1) Connection precautions

(a) For further information about the following items, see the explanation in the applicable section in the User's Manual (Application).

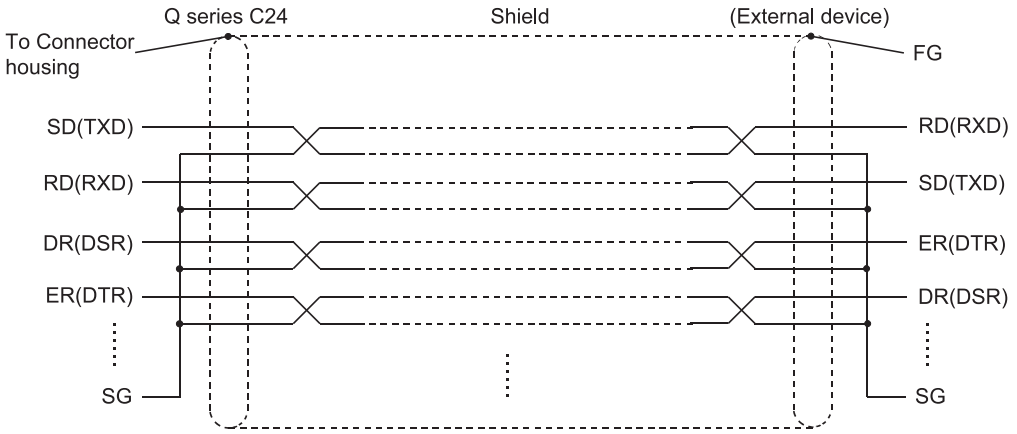
- Controlling the communication on the Q series C24 side by the external device side using the CD(DCD) signal of the RS-232 interface.
  * This is affected by the "CD terminal check designation" in "CHn transmission control and others system setting" screen on GX Configurator-SC.
- Performing half-duplex communication using specifications on the external device side (an example of such a connection is shown in this section).
- Using modem functions.

(b) The connection cable FG signal and shield are connected as follows.

	Connection on the Q series C24 side	Notes
Connection cable FG signal	Connect to the Q series C24 connector housing	Do not short the communication cable FG signal and the SG signal. When the FG signal and the SG signal are connected inside the external device, do not connect the FG signal to the Q series C24.
Connection cable shield	Connect to the external device FG terminal or the Q series C24 connector housing	

(c) When normal data communication is not obtained due to external noise, perform the wiring as follows:

1) Connect the FG terminals on the external device and the Q series C24 using the shield of the connection cable.
2) Signals other than SG should be connected with SG signals in the twisted pair.

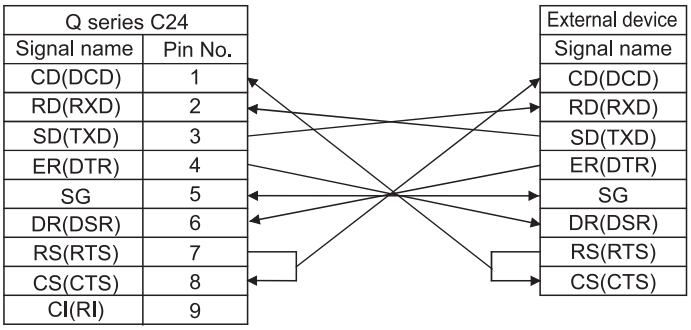


POINT

When using an RS-232 to RS-422 converter to connect the external device and the Q series C24, use a converter that is compatible with the external device and programmable controller CPU system configuration (1:1).

(2) Connection examples

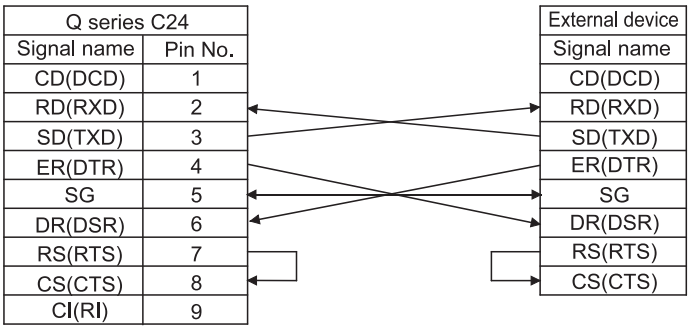
(a) Connection example with an external device capable of turning on and off the CD(DCD) signal (No. 1 pin)



* The CD terminal check setting is set according to the specification of the external device. When wiring shown above, DTR/DSR control or DC code control may be performed.

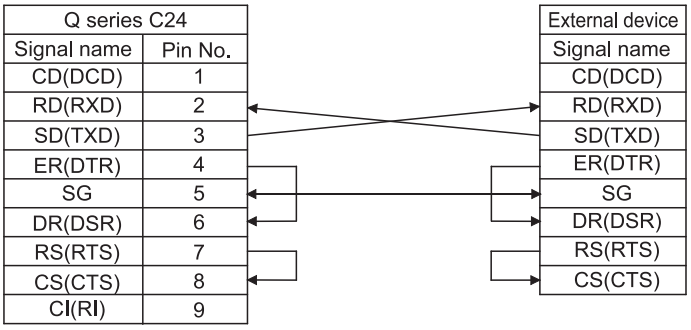
(b) Connection example with an external device not capable of turning on and off the CD(DCD) signal (No. 1 pin)

1) Connection example 1



* When wiring shown above, DTR/DSR control or DC code control may be performed.

2) Connection example 2



* When wiring shown above, DC code control may be performed.

POINT

If the programmable controller CPU and an external device cannot be communicated, try to perform data communication as a connection test, using the wiring connection as shown in Connection example 2.
If data can be communicated using the wiring connection shown in Connection example 2, rewire after checking the interface specifications on the external device side.

4.4.2 Connecting the RS-422/485 interface

The following shows the connection precautions and connection examples when using the Q series C24 RS-422/485 interface.

(1) Connection precautions

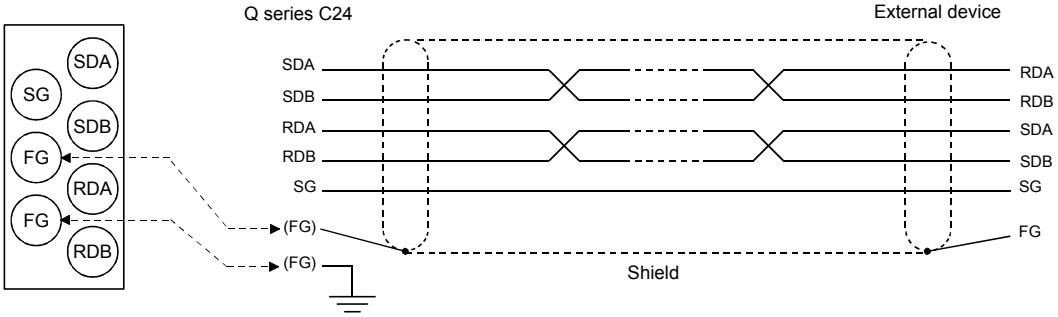
(a) When connecting the Q series C24 SG and FG signals to the external device, connect them according to the specifications of the external device.

(b) Connect the shield of the connection cable to the FG terminal on either of the connected devices.
If normal data communication is not obtained due to external noise even if wiring is made as shown above, perform wiring as follows:

1) Connect between the FG of both stations with the shield of the connection cable.
On the external device side, however, follow the instruction manual of the external device.
Be sure to use the plate terminals included with the product when connecting the braided shield wire to the QJ71C24N-R4.

2) Connect the (FG) of the Q series C24 side to the FG terminal at the power supply module of the station which has the Q series C24 is installed, or to the FG terminal of the control panel on which the Q series C24 programmable controller is installed.

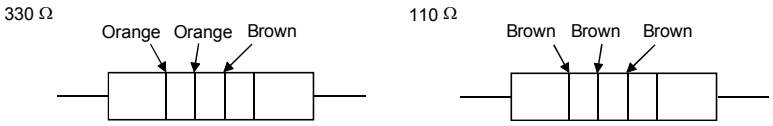
3) Connect nnA and nnB of each signal in the connection cable as a pair.



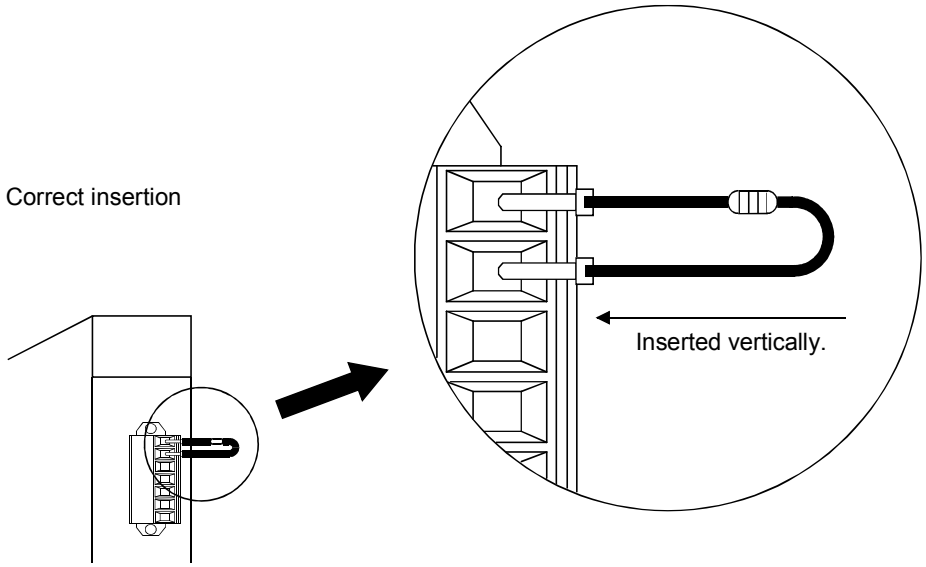
Correspondence of the RS-422/485 terminal block and signal location.

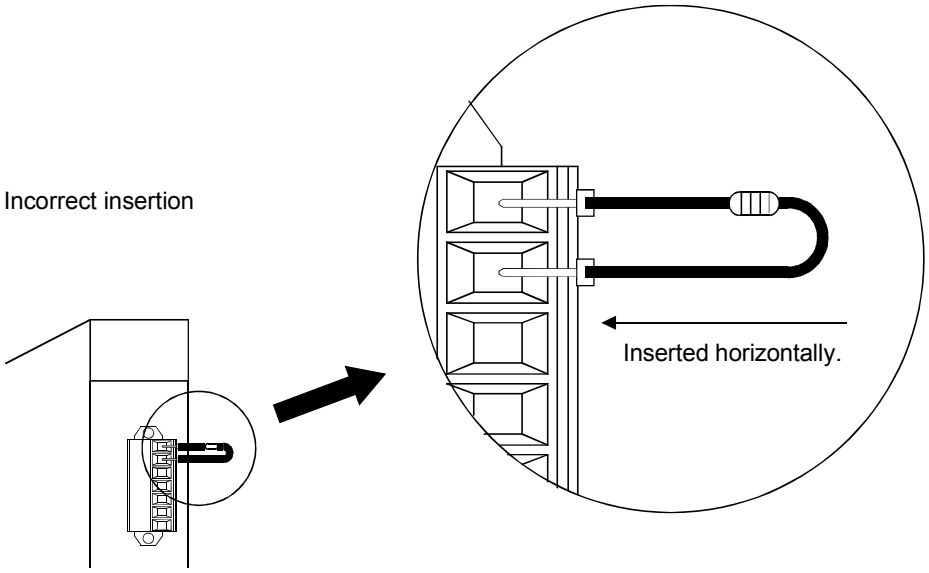
(c) Terminal resistor must be set (or connected) for the station of both ends on the circuit.
Match the Q series C24 to the specifications of the external device and connect a terminal resistor (packed with the Q series C24) according to this section.
Connect, or set a terminal resistor at the external device according to the instruction manual of the external device.
(The terminal resistor to connect to the Q series C24)
- When communications performed using RS-422, "330 Ω 1/4 W" resistor is connected.
- When communications performed using RS-485, "110 Ω 1/2 W" resistor is connected.

* How to discriminate between the terminating resistors



(d) When connecting the terminal resistor of the QJ71C24N-R4 to the RS-422/485 plug-in socket block, insert the terminal resistor in the orientation shown below.





(e) If data cannot be communicated with the external device at all, the polarity of the external device could be wrong and should be checked again. If the polarities of the Q series C24 and the external device do not match, reverse the polarity of each signal on either device side and connect the devices with the cable; this may enable the data to be communicated.

POINT

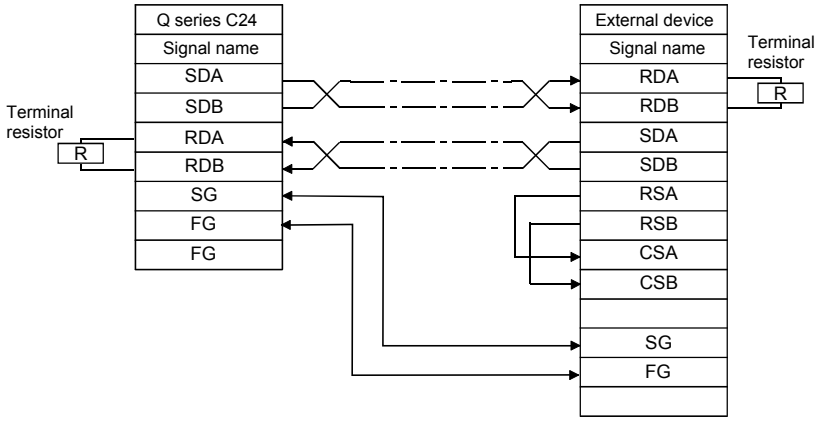
(1) For terminal resistor setting/connection described in this section, when the RS-232 to RS-422 converters or similar device is used at the external device at both ends of the circuit, a terminal resistor must be set, or connected, at the converter.

(2) When using the RS-232 to RS-422 converters to connect the external devices and the Q series C24, use a converter that is compatible with the external device and programmable controller CPU system configuration (1:1, 1:n, m:n).

(3) Device connected to the Q series C24 RS-422/485 interface must be standardized as RS-422 or RS-485, including 1:n, n:1 and m:n connections.

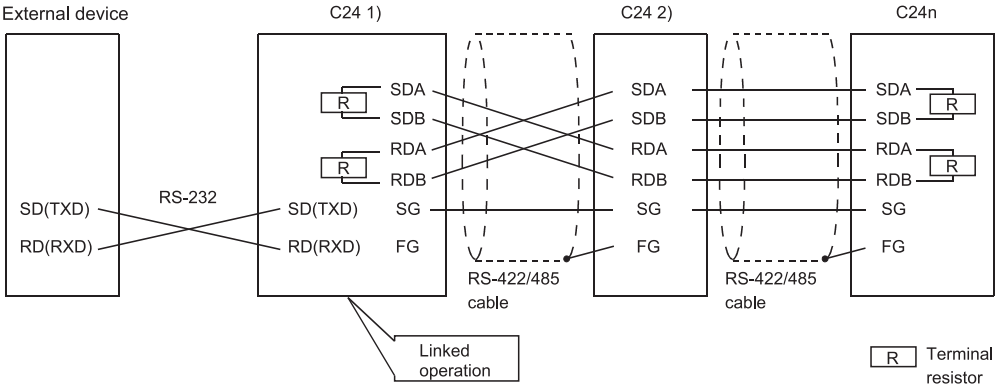
(2) Connection examples

(a) External device and Q series C24 with 1:1 system configuration

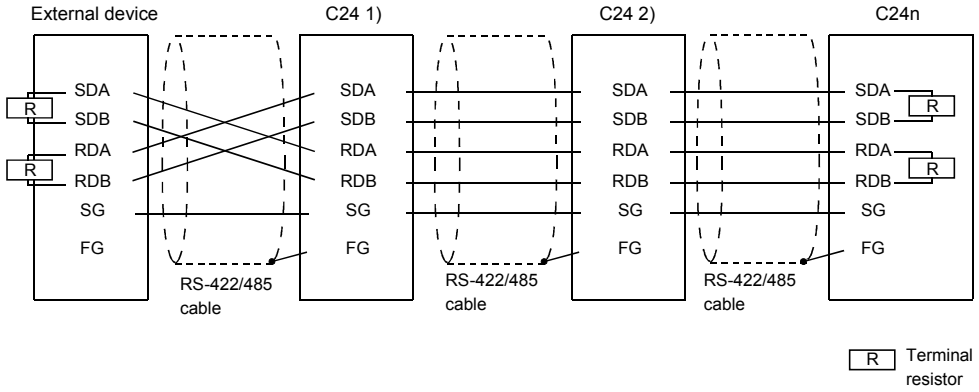


(b) External device and Q series C24 with 1:n (multidrop) system configuration

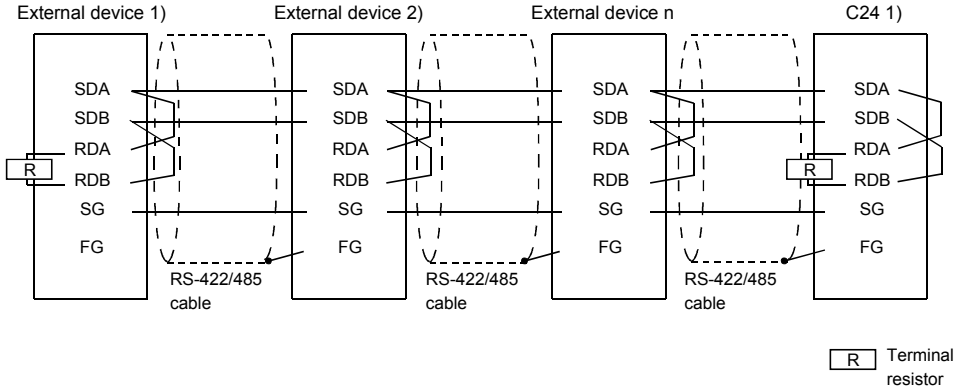
1) Connection example 1



2) Connection example 2

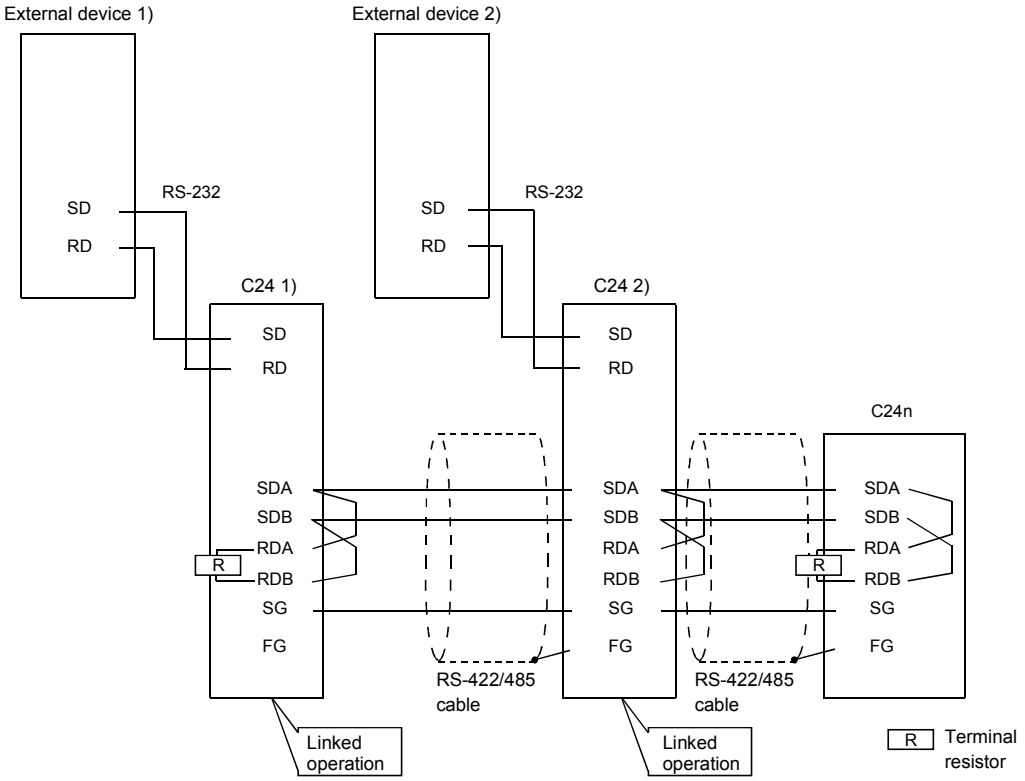


(c) External device and Q series C24 with n:1 (multidrop) system configuration

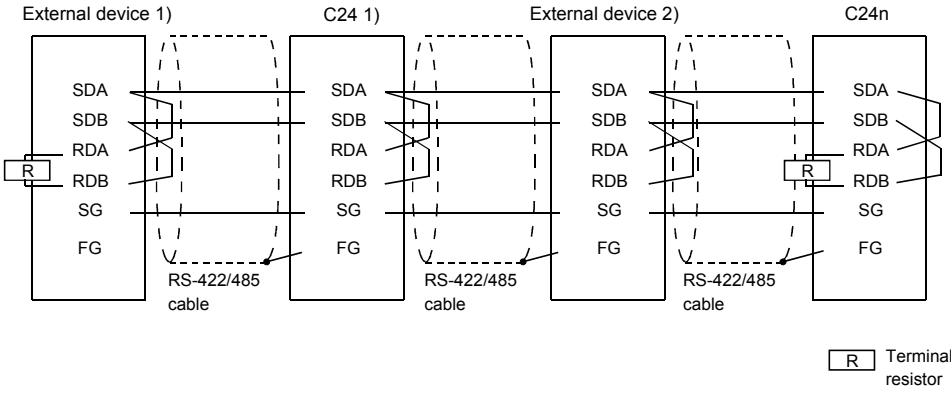


(d) External device and Q series C24 with m:n (multidrop) system configuration

1) Connection example 1



2) Connection example 2



4.5 Settings for GX Developer

This chapter explains various settings via GX Developer that allow the Q series C24 to perform data communication with external devices.
See the User's Manual (Application) for how to perform the remote password setting.

4.5.1 I/O assignment settings

[Setting purpose]

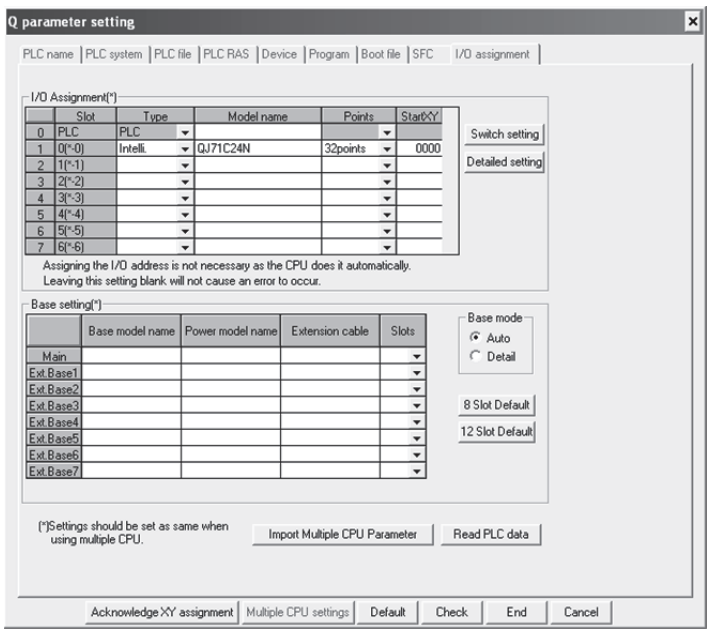
The I/O assignment settings perform the settings for the types of modules to be mounted on a base unit, the range of input/output signals, and switches of the Q series C24.

[Startup procedure]

[PLC parameters] → I/O assignment .

For screen display, see the GX Developer Operating Manual.

[Setting screen]



[Display description]

Item name		Setting for item	Remarks
I/O assignment	Type	Select "intelli.".	—
	Model name	Enter the module model name to be mounted. (Example: QJ71C24N)	
	Points	Select 32 points.	
	Start XY	Enter the start I/O signal (Hexadecimal) for the target module.	
	Switch setting	Set the communication rate, transmission specifications, communication protocol, etc.	See Section 4.5.2.
	Detailed setting	Select the control CPU of the Q series C24 when a multiple CPU system is employed.	See QCPU User's Manual (Multiple CPU System)
Multiple CPU settings		Select when using a multiple CPU system.	

4.5.2 Switch settings for I/O and intelligent functional module

[Setting purpose]

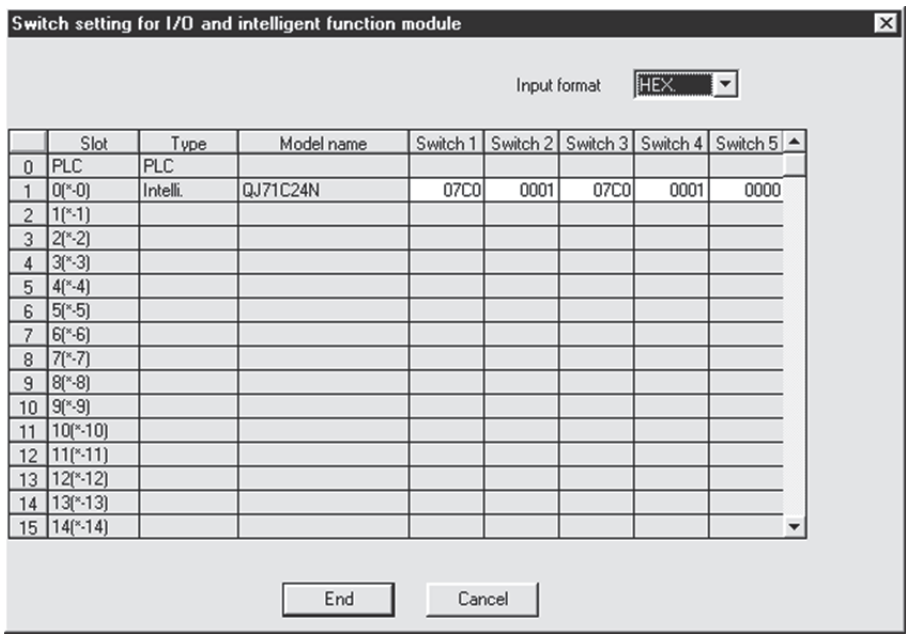
In the switch setting for I/O modules and intelligent functional modules, set the transmission specifications and communication protocols for communication with external devices.

[Setting procedure]

[PLC parameters] → [I/O assignment setting] → Switch setting.

For screen display, see the GX Developer Operating Manual.

[Setting screen]



[Display description]

(1) Switches 1 to 5

Set the transmission specifications and communication protocol of each interface using the combinations of setting values for each switch with 16 bit binary data according to the following table.

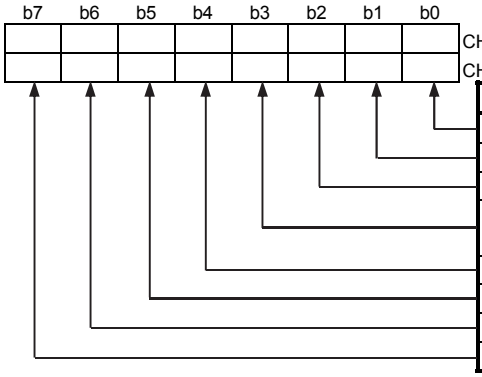
Switch number	Description		Remarks
Switch 1	b15 to b8	b7 to b0	See a) and b)
	CH1 Communication rate setting	CH1 Transmission setting	
Switch 2	CH1 communication protocol setting		See c)
Switch 3	b15 to b8	b7 to b0	See a) and b)
	CH2 Communication rate setting	CH2 Transmission setting	
Switch 4	CH2 Communication protocol setting		See c)
Switch 5	Station number setting		See d)

* For settings to perform linked operation between two Q series C24 interfaces, see (2).

POINT

- When GX Developer or a GOT is connected to the Q series C24 on a 1:1 (one-to-one) basis:
  The interface switch setting connected to GX Developer or a GOT is not required for accessing or monitoring a QCPU. (If the switches are not set, the GX Developer connection mode will be active.)
- When GX Developer or a GOT is connected to the Q series C24 on a 1:n (multi-drop) basis:
  Refer to the GX Developer Operating Manual.

(a) Transmission setting (CH1 side: switch 1 (lower level); CH2 side: switch 3 (lower level))



Bit	Description	OFF (0)	ON (1)	Remarks
b0	Operation setting	Independent	Link	Must be set to OFF on CH1
b1	Data bit	7	8	Parity bit is not included
b2	Parity bit	NO	Yes	Vertical parity
b3	Even/odd parity	Odd	Even	Valid only when parity bit is set to Yes
b4	Stop bit	1	2	—
b5	Sum check code	NO	Yes	—
b6	Write during RUN	Prohibited	Allowed	—
b7	Setting modifications	Prohibited	Allowed	—

* All items listed in the table should be set to OFF for the interfaces for which "GX Developer connection" is set in the communication protocol setting.

The Q series C24 operates with the values set in GX Developer. (See below.)

Transmission setting	Setting description for GX Developer
Operation setting	Independent
Data bit	8
Parity bit	Yes
Even/odd parity	Odd
Stop bit	1
Sum check code	Yes
Write during RUN	Allowed
Setting modifications	Allowed/Prohibited

1) Operation setting
   - This sets whether to use each of the two Q series C24 interfaces for independent data communication, or to use the two for linked data communication.
   - The setting and data flow for linked operation is explained in (2).
2) Data bit setting
   - This sets the bit length for one character in data communicated with an external device according to the specifications of the external device. (When data communication is performed using format 5 of the MC protocol (for binary code communication) or using the bidirectional protocol, it is necessary to set it to 8 bits.)
   - If 7 bits are set, the data is communicated by ignoring the most significant bit (8th bit).
3) Parity bit setting
   - This sets whether or not a parity bit (vertical parity) is added for one byte of transmission/receive data, according to the specifications of the external device.
   - The addition of the parity bit to the transmission data and the checking of the parity bit of receive data are performed by the Q series C24.

4) Even/odd parity setting
This sets whether the parity bit (vertical parity) should be odd parity or even parity when adding the parity bit (vertical parity), according to the specifications of the external device.

5) Stop bit setting
This sets the stop bit length for one character in data communicated with an external device, according to the specifications of the external device.

6) Sum check code setting
- This sets according to the specifications of the external device whether or not a sum check code is added to transmission and reception messages of each frame and format during data communication using the MC or bidirectional protocol.
- For an explanation of the message configuration and sum check code when a sum check code is added (set to Yes), see the applicable explanation of each protocol.

7) Write during RUN setting
- This sets according to the system specifications whether or not data transmitted using the MC protocol is written to the programmable controller CPU from an external device while the programmable controller CPU is running.
- When write during RUN is prohibited (disabled), the data is not written and an NAK message is returned if the external device requests the programmable controller CPU to write data while it is running.
- For an explanation of the functions available in this setting, check in the "write allowed setting" and "write prohibited setting" columns in the command list of the Reference Manual.

8) Setting modifications setting
This sets whether or not the following actions are allowed after starting up the Q series C24.
Changing data communication functions and transmission
- Specifications, and the switching mode of each interface
- Writing data to the flash ROM (writing the system setting values and user frame)

POINT

(1) A setting change in the connected interface side should be set to Allowed, in order to register a user frame to the flash ROM from an external device using the MC protocol.

(2) Setting changes in interfaces on the CH1 and CH2 sides should both be set to Allowed, in order to register the system setting values and user frames to the flash ROM from the programmable controller CPU.

(b) Communication rate setting (CH1 side: switch 1 (upper level); CH2 side: switch 3 (upper level)) ＊1 ＊2 ＊3

Communication rate (Unit: bps)	Bit position b15 to b8	Communication rate (Unit: bps)	Bit position b15 to b8	Remarks
50	$0F_H$	14400	06_H	Try lowering the communication rate when data cannot be communicated normally with an external device due to overrun errors and framing errors etc.
300	00_H	19200	07_H	
600	01_H	28800	08_H	
1200	02_H	38400	09_H	
2400	03_H	57600	$0A_H$	
4800	04_H	115200	$0B_H$	
9600	05_H	230400	$0C_H$	

＊1 Transmission speed of 230,400 bps is available for only CH1 of the QJ71C24N (-R2/R4).

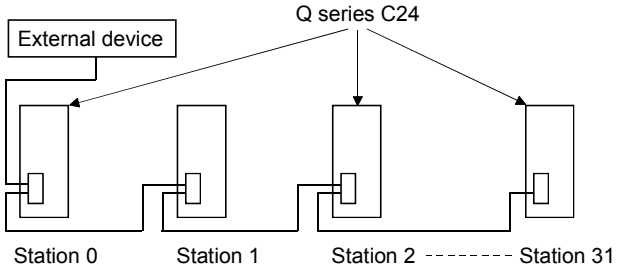
＊2 When connecting external devices to both of two interfaces, the total of the communication speed should be 115,200bps or less (230,400 bps or less if using QJ71C24N (-R2/R4)). When connecting an external device to either of two interfaces, the maximum of 115,200 bps is available for the interface (the maximum of 230,400 bps if using QJ71C24N (-R2/R4)). In this case, set 300 bps for the other interface to which no external device is connected.

＊3 Set "00_H" to the interface for which "GX Developer connection" is set in the communication protocol setting. The serial communication module will operate at the communication speed set on GX Developer.

(c) Communication protocol setting (CH1 side: switch 2; CH2 side: switch 4)

Set number	Description		Remarks
0_H	GX Developer connection (For connection to MELSOFT products)		GX Developer communication rate and transmission specifications are automatically set.
1_H	MC protocol	Format 1	For communication with ASCII code in the specified form of an A compatible 1C frame or QnA compatible 2C/3C/4C frame
2_H		Format 2	
3_H		Format 3	
4_H		Format 4	
5_H		Format 5	For communication with binary code in a QnA compatible 4C frame
6_H	Non procedure protocol		For communication using non procedure protocol
7_H	Bidirectional protocol		For communication using bidirectional protocol
8_H	For linked operation setting		Set to the CH1 side when CH1 and CH2 interfaces are used in linked operation (operated with the communication protocol of the CH2 side).
9_H	Pre-defined protocol		For communication using pre-defined protocol
A_H to D_H	Setting prohibited		—
E_H	ROM/RAM/switch test		For self-diagnosis of the modules
F_H	Individual station loopback test		For checking operation of each interface of the modules

(d) Station number setting (switch 5 (common for both CH1 and CH2 sides))
- This setting is for communication using the MC protocol.
- When several the Q series C24s are connected on the same line with multidrop connection, set the station number designated in the data items of the transmission frame in each external device to 0 to 31 (0_H to $1F_H$).
  * This number designates which external device is to be communicated with the Q series C24.
- Set the station number to 0 when the system configuration of the external device and the programmable controller CPU is 1:1.



POINT

If the communication of data with external device is to be started, check the specifications of the functions to be used and then make the settings and connect the cables.
Configure the following switch settings from GX Developer if there is to be no communication (if the cables are not to be connected) at the interface.
- Communication protocol setting : Set any of 0_H to 7_H, or 9_H.
- Transmission setting, communication rate setting : Set all to OFF.

(2) The setting and data flow in linked operation

(a) Set the related switches as follows when two Q series C24 interfaces are in linked operation.

Switch number		Settings		Setting value
Switch 1	CH1 side	Transmission setting	Operation setting	b0 = OFF
			Data bit setting	Set each switch on both CH1 and CH2 sides to the same specification.
			:	
		Communication rate setting		Match the external device.
Switch 2		Communication protocol setting		8_H
Switch 3	CH2 side	Transmission setting	Operation setting	b0 = ON
			Data bit setting	Set each switch on both CH1 and CH2 sides to the same specification.
			:	
		Communication rate setting		Match the external device.
Switch 4		Communication protocol setting		0_H to 6_H
Switch 5		Station number setting		Set according to (d) of (1)

(b) Do not use the above settings for the following cases, because linked operation cannot be performed.

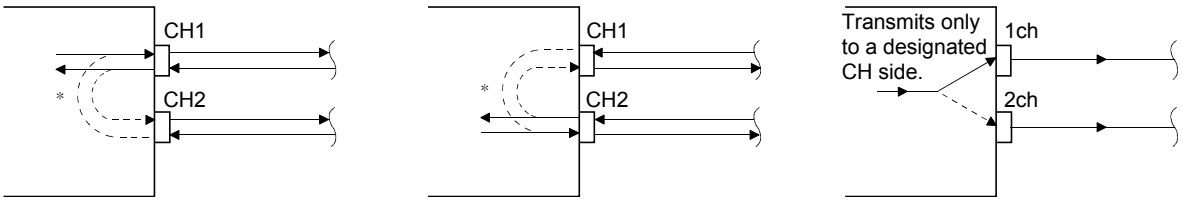
1) When using the QJ71C24N-R2 or QJ71C24-R2.
2) When an external device is not connected to either of the interfaces.
3) When using the bidirectional or pre-defined protocol.
4) When communicating data with an external device connected to two interfaces that are not interacting, using functions set in the communication protocol settings (MC protocol/non procedure protocol).
5) When communicating data using the modem function.

POINT
When two interfaces are in linked operation, the transmission time for one character becomes equal to the hardware gate off time of the Q series C24.

(c) The data flow in linked operation is as follows.

1) Two interfaces operate linked together using functions defined with the communication protocol setting on the CH2 side (MC protocol in the same format or a non procedure protocol) within the transmission specifications set in the respective transmission settings (specifications for CH1 and CH2 must be the same).

Q series C24 (data flow in linked operation)



* In linked operation, all data received from one of the two interfaces is transmitted from the other interface. In this case, exclusive control of the received data is necessary when data is communicated using the non-procedure protocol since all the connected stations receive the data. When data communication is performed using the MC protocol, only the Q series C24 having the station number designated in the message performs the process designated by the command. Furthermore, when data communication is performed using QnA compatible 2C/3C/4C frames of the MC protocol, the header information for linked operation is added to messages directed to other stations linked by multidrop connection.

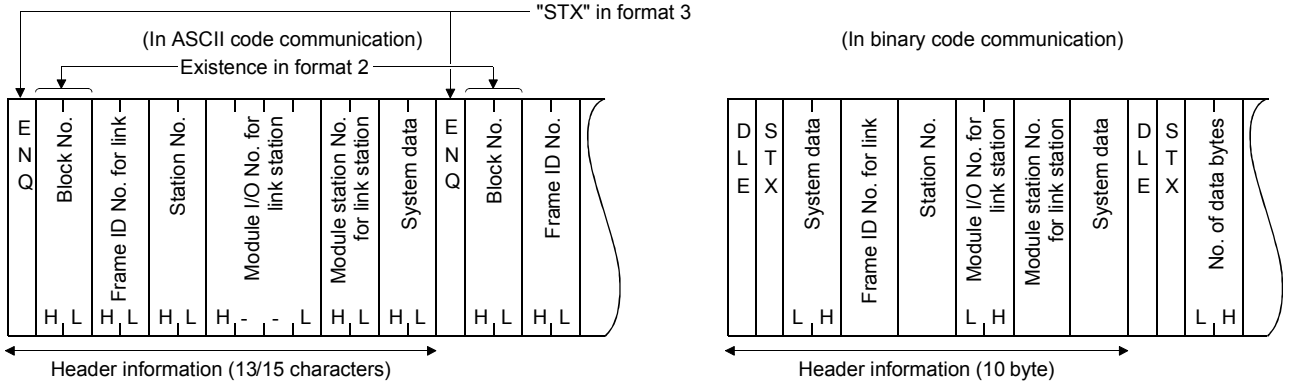
  ⓐ Processing performed by the Q series C24 connected to an external device
  - The header information is added to the command messages received from the external device that are directed to other stations and sends them to the stations through the other interface.
  - The header information is deleted from the response messages received from other stations and sends them to the external device using the other interface.
    (The header information is also sent during m:n connection.)

  ⓑ Operation of the accessed station
  The accessed station processes the request contained in the command message, adds the header information to a response message, and sends it using the interface that received the command message.

REMARKS

The following describes the header information that is added by the Q series C24 to a message in linked operation.

1) When communicating with ASCII code (formats 1 to 4)
   The following 13- or 15-character header information is added immediately before the control code (ENQ/STX/ACK/NAK) at the start of each message (13 characters for formats 1, 3 and 4; 15 characters for format 2).
2) When communicating in binary mode (format 5)
   The following 10-byte header information is added immediately before the control code (DLE + STX) at the start of each message.



4.5.3 The Intelligent function module interrupt pointer setting

The following explains the interrupt pointer setting with GX Developer in order to receive data using an interrupt program.
For how to receive data using an interrupt program, see the User's Manual (Applications).

[Setting purpose]

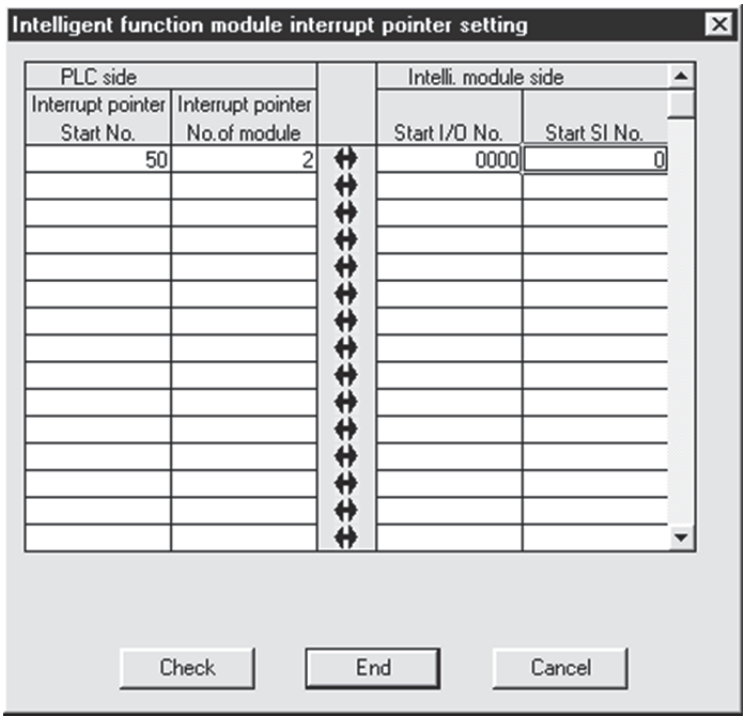
The intelligent function module interrupt pointer sets the information to read the receive data with an interrupt program of the programmable controller CPU during communication using the non procedural/bidirectional protocol.
By performing this setting, an interrupt program starts when data is received from an external communicating device and the reading of data received by the programmable controller CPU becomes possible.

[Startup procedure]

[PLC parameters] → [PLC system setting] → Interrupt pointer setting.

For display screen, see the GX Developer Operating Manual.

[Setting screen]



[Setting description]

(1) Interrupt pointer start No. on the PLC side
Set the start number (ranging from 50 to 255) of the interrupt pointer (Ixx) for use in the sequence program.

(2) Interrupt pointer No. of units on the PLC side
Set the number of units (2) of interrupt pointers (I) for use in the sequence program.

(3) Start I/O No. on the intelligent module (unit) side
Set the start I/O No. for the Q series C24.

(4) Start SI No. on intelligent module (unit) side

1) Assign control numbers (SI) on the Q series C24 side to the interrupt pointers (Ixx) used in the sequence program.
2) Set the start SI No. (0) of the interrupt control numbers.
3) The interfaces for data reception corresponding to the interrupt control numbers are as follows:
SI No. 0: for interface on the CH1 side
SI No. 1: for interface on the CH2 side

4.6 Settings with the Utility Package (GX Configurator-SC)

The settings defined with GX Configurator-SC for operation of the Q series C24 are described in Chapter 8.
The following concerns the data set from GX Configurator-SC.

1) Data set in the Q series C24 for the use of specific functions
2) Data set in the programmable controller CPU to communicate information between the Q series C24 and the programmable controller CPU of the mounting station.

This section explains the "Auto refresh settings" of the data mentioned in 2) above.

[Setting purpose]

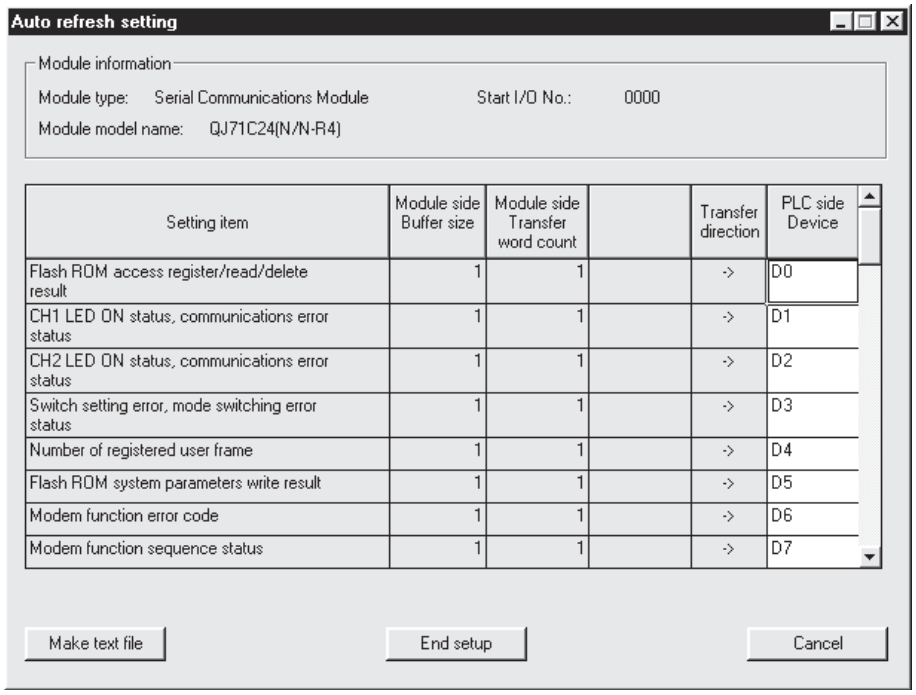
The auto refresh settings are defined to automatically store the information stored in the buffer memory of the Q series C24 in devices designated by the programmable controller CPU.
By this setting, the users can see the module information without accessing the Q series C24.

[Setup procedure]

[Tools] → [Intelligent function utility] → [Start] → "Select a target intelligent function module" screen → Auto refresh .

For display screen, see Section 9.3.

[Setting screen]


Auto refresh setting
Module information
Module type: Serial Communications Module
Start I/O No.: 0000
Module model name: QJ71C24(N/N-R4)
Setting item
Module side Buffer size
Module side Transfer word count
Transfer direction
PLC side Device
Flash ROM access register/read/delete result 1 1 -> D0
CH1 LED ON status, communications error status 1 1 -> D1
CH2 LED ON status, communications error status 1 1 -> D2
Switch setting error, mode switching error status 1 1 -> D3
Number of registered user frame 1 1 -> D4
Flash ROM system parameters write result 1 1 -> D5
Modem function error code 1 1 -> D6
Modem function sequence status 1 1 -> D7
Make text file
End setup
Cancel

Point

Auto refresh settings can be also set for items not listed below with GX Works2. (Refer to Appendix 1.1 (3).)

[Setting items]

Setting item		Buffer memory address CH1	Buffer memory address CH2	Reference section
Flash ROM access register/read/delete result		4H		Section 9.6.10 Section 11.1
CH1/CH2 LED ON status, communication error status (*1)		201H	202H	
Switch setting error, mode switching error status (*1)		203H		
Number of registered user frame		204H		
Flash ROM system parameters write result		220H		
Modem function error code		221H		Section 9.6.2 User's Manual (Application)
Modem function sequence status		222H		
Number of data registrations for connection		223H		
Number of data registrations for initialization		226H		
Number of notification execution		229H		
Data storage area 1 notification execution data No.		22AH		
Data storage area 2 notification execution data No.		22EH		
Data storage area 3 notification execution data No.		232H		
Data storage area 4 notification execution data No.		236H		
Data storage area 5 notification execution data No.		23AH		
Accumulated count of unlock process normal completion		22FBH		
Accumulated count of unlock process abnormal completion		22FCH		
Accumulated count of lock process based on circuit disconnection		22FFH		
CH1/CH2 communication protocol status (*1)		252H	262H	Section 4.5.2 Section 9.6.3 Section 11.1
Transmission status (*1)		253H	263H	
RS-232 control signal status (*1)		254H	264H	
Transmission sequence status (*1)		255H	265H	Sections 9.6.4 to 9.6.6 Section 11.1
On-demand execution result		256H	266H	
Data transmission result		257H	267H	
Data reception result		258H	268H	
MC protocol transmission error code		25AH	26AH	
Receive user frame nth		25BH	26BH	Section 9.6.5 User's Manual (Application)
User frame being transmitted		B6H	156H	
PLC CPU monitoring function	Operation status	2204H	2304H	Section 9.6.8 User's Manual (Application)
	Execution result	2205H	2305H	
	Number of transmission	2206H	2306H	
Monitoring condition arrival block No.		2207H	2307H	
Pre-defined protocol function error code		4042H	4052H	Section 11.2.1

*1 See Section 11.1 for the contents of the buffer memory.

(1) Devices

(a) Set the word device of the programmable controller CPU which stores information in the setting item field when using the auto refresh function between the Q series C24 and the programmable controller CPU.

(b) The devices used must be of the types X, Y, M, L, B, T, C, ST, D, W, R, or ZR.

* If bit devices of types X, Y, M, L, or B are used, a number that can be divided by 16 points (e.g., X30, Y120, M16, etc.) should be specified. The buffer memory data is stored in 16 point units from the specified device number (e.g., if M16 is set, data is stored from M16 to M31).

(c) The device can be set to auto refresh for required information only.

(2) Writing auto refresh settings to QCPU and saving them in a file

(a) Writing auto refresh settings to QCPU
Use online programmable controller write function of GX Configurator-SC or GX Developer.

(b) Saving in a file
Use the file storage function shown in the file items in the parameter module selection screen shown in Section 9.3.2. of GX Configurator-SC.

POINT

(1) The auto refresh settings are stored in the intelligent function module parameter.
After the intelligent function module parameters have been written to the CPU module, it enables the auto refresh setting by turning the power OFF → ON or by resetting the CPU module.

(2) The auto refresh settings cannot be changed from the sequence program. However it is possible to add a process similar to auto refresh by using the FROM/TO command of the sequence program.

4.7 Individual Station Test

After installing the Q series C24 to the base unit of QCPU, perform an individual station test first to check the switch setting (see Section 4.5.2) and operation of the Q series C24.

POINT

(1) When a problem occurs during data communication with an external device, perform an individual station test as described in this section to check whether or not there is any problem in the operation of the Q series C24.

(2) In order to avoid problems, set the programmable controller CPU to STOP status during the individual station test.

(3) Test both interfaces of the Q series C24 simultaneously in an individual station loopback test.
Alternatively, either one of the interfaces can be tested in an individual station loopback test.
In that case, ignore the test results on the interface side for which the test is not performed.

(4) Cable removal and reconnection before and after the individual station loopback test should be performed with the power to the Q series C24 mounting station turned off.

(5) To restart data communication with an external device after an individual station test, check the specifications of the devices used before defining various settings and reconnecting cables.
For the interface that is not used for communication (no cable connection), define the switch settings in GX Developer as follows (for the setting method, see Section 4.5.2).
- Communication protocol setting: any of 0_H to 7_H, or 9_H
- Transmission settings and communication rate settings: all set to OFF.

(6) If an error occurs even though the correct settings have been made for the Q series C24 through an individual station test, please consult your local Mitsubishi representative.

4.7.1 ROM/RAM/switch tests

A ROM/RAM/switch test checks the contents of the memory of the Q series C24 and the switch settings set with GX Developer.
Perform a ROM/RAM/switch test with the procedure described below.

(Procedure 1) Communication protocol setting and transmission setting (see Section 4.5.2)

(1) Set the communication protocol setting on the CH2 side to E_H (ROM/RAM/switch test). Set the communication protocol setting on the CH1 side to the number (1 to 9) used for data communication with an external device following the test.

(2) Set the transmission settings for the two interfaces to match the specifications used when communicating data with an external device.

(Procedure 2) Performing ROM/RAM/switch tests

(1) Set the programmable controller CPU to STOP status.

(2) Restart the programmable controller CPU station or reset the CPU. The test starts automatically in about one second.

(3) For the Q series C24, the following tests should be performed once.

1) ROM check
Read the ROM data and verify the sum check.

2) RAM check
Write data to RAM, and read and check it.

3) Switch check
Check whether or not each switch is set within the tolerance range and the operation setting in the transmission settings is set to off.

4) Linked operation setting check (perform this test with the operation setting in the transmission settings of CH2 set to on)
Check to see that the communication protocol setting on CH1 is set to 8H and whether the communication rate setting of each channel is within the tolerance range.
＊ A linked operation setting check is performed when values are set as follows:
• Communication protocol setting on the CH1 side : 8H
• Operation setting in the transmission settings on the CH2 side : bit 0 = ON.

(Procedure 3) Checking results of ROM/RAM/switch tests

(1) The test is completed when the NEU LED on CH1 side is lit (approximately 2 seconds).

(2) The test is completed normally when the ERR LED turns off.

(3) The test is completed with error when the ERR LED turns on. Check the error description in one of the following screens.
• The "Monitor/test others" screen of GX Configurator-SC (see Section 9.6.10)
• The buffer memory monitor screen of GX Developer (see the GX Developer Manual for the operation method)
＊ When checking errors in the buffer memory monitor screen of GX Developer, monitor the following buffer memory.

Check the error descriptions on the screens by bit-decoding the monitored value (16-bit integer). Each bit corresponds to the following error description.

<table>
<tr><th colspan="4">Buffer memory monitored</th><th rowspan="2" colspan="2">Description when corresponding bit is on</th><th rowspan="2">Corrective action</th></tr>
<tr><th>Address / Bit location</th><th>CH1 side
201H</th><th>CH2 side
202H</th><th>CH1/CH2 side
203H</th></tr>
<tr><td>b0</td><td colspan="2">—</td><td>—</td><td colspan="2">—</td><td rowspan="5">Review setting value
(see Section 4.5.2)</td></tr>
<tr><td>b1</td><td colspan="2">SIO</td><td>—</td><td rowspan="2">When linked operation setting</td><td>Transmission setting error</td></tr>
<tr><td>b2</td><td colspan="2">PRO</td><td>—</td><td>Protocol setting error</td></tr>
<tr><td>b3</td><td colspan="2">P/S</td><td>—</td><td rowspan="2">When independent operation setting</td><td>Transmission setting error</td></tr>
<tr><td>b4</td><td colspan="2">C/N</td><td>—</td><td>Protocol setting error</td></tr>
<tr><td>b5 to b6</td><td colspan="2">—</td><td>—</td><td colspan="2">—</td><td>—</td></tr>
<tr><td>b7</td><td>NEU</td><td>—</td><td></td><td colspan="2">Test completed</td><td>—</td></tr>
<tr><td>b8 to b13</td><td colspan="3">—</td><td colspan="2">—</td><td>—</td></tr>
<tr><td rowspan="3">b14</td><td rowspan="3">—</td><td>CH2 ERR</td><td>—</td><td colspan="2">RAM error</td><td>(＊1)</td></tr>
<tr><td>—</td><td>Setting station number</td><td colspan="2">Out of the setting station number range</td><td>Review setting value
(see Section 4.5.2)</td></tr>
<tr><td>b15</td><td>CH1 ERR</td><td>—</td><td colspan="2">ROM error</td><td>(＊1)</td></tr>
</table>

＊1 Please consult your local Mitsubishi representative.

(Procedure 4) Ending a ROM/RAM/switch test

(1) Perform the following procedures after checking normal completion/abnormal completion of the test results.
Normal completion : Perform operation (2) to finish tests.
Upon error occurrence : When an error occurs in a switch check or linked operation setting check, set the correct values and test again.
When an error occurs in a ROM or RAM check, check the mounting status of module and test again.
If there is no error in the mounting status of module, please consult your local Mitsubishi representative.

(2) Perform the ending procedure for ROM/RAM/switch test

1) Follow the procedure in Section 4.7.2 to perform an individual loopback test operation.
2) Perform the following procedure to end the test and start data communication with an external device.
- Set the switch settings on GX Developer according to the procedure specified in Section 4.5.2.
- Turn off the power to the station on which the Q series C24 is installed and connect the communication cable with an external device.
- Turn on the power to the station on which the Q series C24 is installed.

4.7.2 Individual station loopback test

The individual station loopback test checks the operation of the communication function of the Q series C24.
Follow the procedure below to perform an individual station loopback test.

(Procedure 1) Connecting cable

(1) Connect cables to two interfaces as follows.
- Connect cables to the RS-232 interface within the connector and install it to the interface.
- Connect cables to the RS-422/485 interface on a terminal block.

RS-232 interface (D-Sub 9P)

Q series C24 side		Cable connection
Signal name	Pin No.	
CD(DCD)	1	
RD(RXD)	2	
SD(TXD)	3	
ER(DTR)	4	
SG	5	
DR(DSR)	6	
RS(RTS)	7	
CS(CTS)	8	
CI(RI)	9	

RS-422/485 interface

Q series C24 side	Cable connection
Signal name	
SDA	
SDB	
RDA	
RDB	
SG	
FG	
FG	

(Procedure 2) Communication protocol setting and transmission setting (see Section 4.5.2)

(1) Set the communication protocol setting to FH (individual station loopback test) for both interfaces.

(2) Set transmission setting of the two interfaces according to the transmission specification for data communication with an external device.

(Procedure 3) Performing the individual station loopback test

(1) Set the programmable controller CPU to STOP status.

(2) Restart the programmable controller CPU station or reset the CPU. The test starts automatically in about one second.

(3) For the Q series C24, perform the following tests in sequence and repeat them (one test cycle takes approximately one second).
＊ End testing when all test results become abnormal.
1) Check communication with the programmable controller CPU
Read and check the model type of the programmable controller CPU.
2) Check transmission and reception functions of the interface
Perform communication while changing data.

(4) The LED corresponding to a test item flashes when the test starts.
- The CH1 NEU LEDs flash when checking communication with the programmable controller CPU.
- The SD and RD LEDs of the interface being tested flash when checking the communication functions of interface.

(Procedure 4) Checking the results of an individual loopback test

(1) This test is performed repeatedly. When the ERR LED is off, the test is being executed normally.

(2) The test is completed with an error when the ERR LED is lit. Check the error description on one of the following screens. (The ERR LED is lit upon error occurrence, and the test is completed.)
- The "Monitor/test others" screen of GX Configurator-SC (see Section 9.6.10)
- The buffer memory monitor screen of GX Developer (see the GX Developer Manual for operation method)
  * When checking for errors in the buffer memory monitor screen of GX Developer, monitor the LED ON status and communication error status (address: 201H/202H).

Check the error descriptions on the screens by bit-decoding the monitored value (16-bit integer). Each bit corresponds to the following error description.

Buffer memory monitored			Description when corresponding bit is on	Corrective action
Address / Bit location	CH1 side 201H	CH2 side 202H		
b0 to b3	—		—	—
b4	C/N	—	Error occurrence in the CPU module.	Remove errors occurring in the CPU module.
			Not enough power supply capacity.	Examine the power supply capacity.
			Module is not mounted correctly.	Reinstall the module properly.
			Error occurrence in the base unit, extension cable, CPU module, or the Q series C24.	Check each module and remove the cause of the error. Reconnect the cable correctly. Reinstall the module correctly.
b5 to b13	—		—	—
b14	—	CH2 ERR	CH2 side communication error	Reconnect the cable correctly. Examine the test wiring connection.
b15		CH1 ERR	CH1 side communication error	

(Procedure 5) Ending individual station loopback test

(1) Perform the following procedures after checking normal completion/abnormal completion of the test result.
Normal completion : Perform operation (2) to finish the test.
Upon error occurrence : Remove the cause of the error according to the corrective action specified in the table above, and test again.

(2) Perform the ending procedure for individual station loopback test
1) Follow the procedure in Section 4.7.1 to perform a ROM/RAM/switch test.
2) Perform the following procedure to end the test and start data communication with an external device.
- Set the switch settings on GX Developer according to the procedure specified in Section 4.5.2.
- Turn off the power to the station on which the Q series C24 is installed and connect the communication cable with the external device.
- Turn on the power to the station on which the Q series C24 is installed.

4.8 Loopback Test

A loopback test performs a communication test using the loopback test function of the MC protocol, in order to check the connection between the Q series C24 and an external device, the communication function of each device, and the operation of the communication program of the external device.

(Procedure 1) Connecting the Q series C24 to an external device

Turn off the power to the station on which the Q series C24 is installed and connect a communication cable to an external device to perform data communication using the MC protocol (see Section 4.4).

(Procedure 2) Switch setting with GX Developer

(1) Set the switch settings with GX Developer as shown in Section 4.5 and write the parameters to the programmable controller CPU in order to perform data communication using the MC protocol.

(2) The following is an example of the settings when performing a loopback test on the interface on the CH1 side.

- Switch 1: 0544H Transmission setting
  - Operation setting : Independent operation
  - Data bit : 7 bit
  - Parity bit : Yes (odd)
  - Stop bit : 1 bit
  - Sum check code : No
  - Write during RUN : Allowed
  - Setting modification : Prohibited
  - Communication rate setting : 9600 bps
- Switch 2: 0001H Communication protocol setting : MC protocol (format 1)
- Switch 3: 0000H
- Switch 4: 0000H
- Switch 5: 0000H Station number setting : 0 station

(Procedure 3) Performing a loopback test

(1) Set the programmable controller CPU to STOP status, and turn the power on or reset the CPU (communication is enabled in about one second).

(2) Create a program for a loopback test on the external device side and send a command message like the one in the example below to the Q series C24.
The commands used are as follows:
- When performing communication test in an A compatible 1C frame: TT command (for an example, see the following page)
- When performing communication test in a QnA compatible frame: 0619 command

✻ See the Reference Manual when performing communication tests in a QnA compatible frame.

(Procedure 4) Checking loopback test result

(1) The Q series C24 sends a response message to the external device when it receives a loopback test command message.

✻ The Q series C24 sends the external device the received data as is.

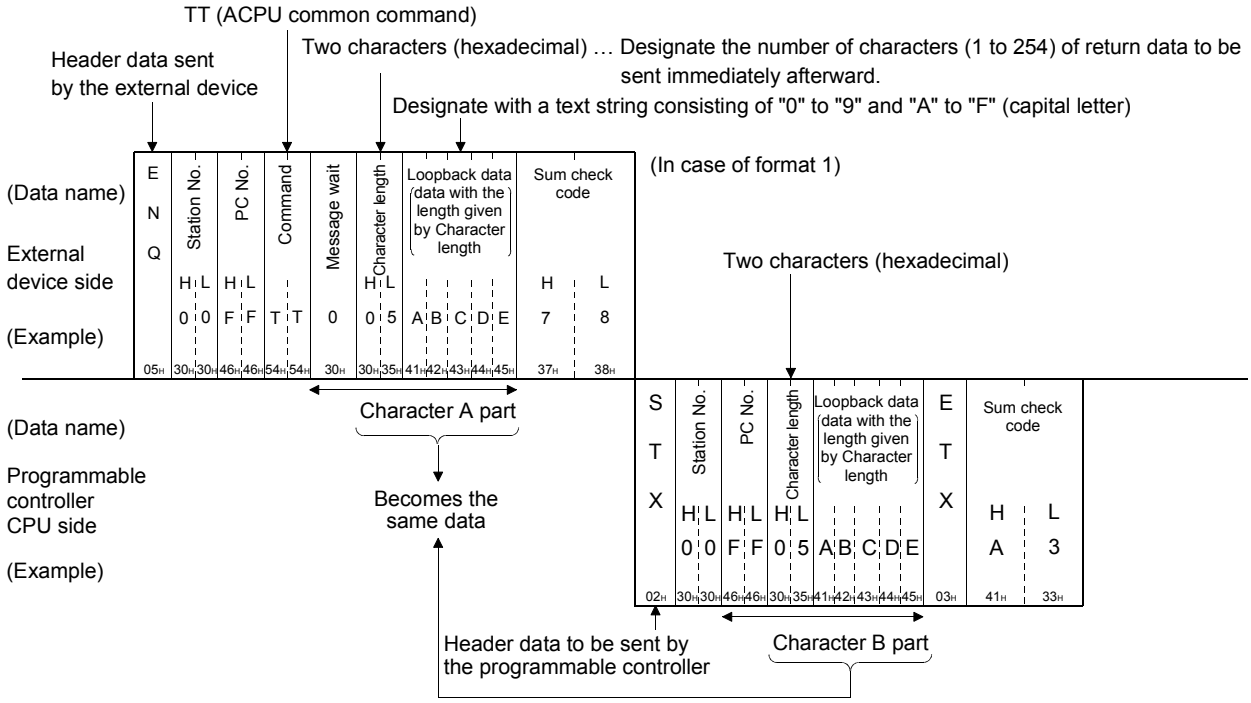
(2) Check on the external device whether the data received from the Q series C24 matches the data sent from the external device.

(Procedure 5) Ending the loopback test

Perform the following procedure according to the function used, and start data communication.

- Set the switch settings with GX Developer according to the procedure specified in Section 4.5.2.
- Turn on the power to the station on which the Q series C24 is installed.

* An example of control procedure when the TT command is used in the loopback test mentioned in Procedure 3.
(Station number: 00, sum check code: Yes)


TT (ACPU common command)
Header data sent by the external device
Two characters (hexadecimal) … Designate the number of characters (1 to 254) of return data to be sent immediately afterward.
Designate with a text string consisting of "0" to "9" and "A" to "F" (capital letter)
(In case of format 1)
(Data name)
External device side
(Example)
ENQ
Station No.
PC No.
Command
Message wait
Character length
Loopback data (data with the length given by Character length
Sum check code
H L
0 0 F F T T 0 0 5 A B C D E 7 8
05H 30H 30H 46H 46H 54H 54H 30H 30H 35H 41H 42H 43H 44H 45H 37H 38H
Two characters (hexadecimal)
Character A part
(Data name)
Programmable controller CPU side
(Example)
Becomes the same data
STX
Station No.
PC No.
Character length
Loopback data (data with the length given by Character length
ETX
Sum check code
H L
0 0 F F 0 5 A B C D E A 3
02H 30H 30H 46H 46H 30H 35H 41H 42H 43H 44H 45H 03H 41H 33H
Header data to be sent by the programmable controller
Character B part

4.9 Maintenance and Inspection

This section explains the maintenance and inspection and installing and removing of the Q series C24.

4.9.1 Maintenance and inspection

The Q series C24 has no special inspection items other than below.
For items other than listed below, perform inspection according to the inspection items listed in the User's Manual of the programmable controller CPU module in order to always use the system in the optimal condition.

(The Q series C24 inspection items)

1) Check if the terminal resistors and cables are connected securely.
2) Verify that the module fixing screws and the terminal block installation screws are securely tightened.

POINT
Be sure to read through the Safety Precautions in the beginning of this manual regarding the Q series C24 inspection and maintenance.

4.9.2 When mounting/dismounting the module

Please read 4.1, "Handling Precautions" before mounting or dismounting the module, and make sure to pay attention to safety and handle the module properly during the operation.
When replacing the Q series C24 and QCPU, it becomes necessary to register the following data on the Q series C24 again for the module to be replaced.

- Q series C24: System setting data in the flash ROM
- QCPU: PLC parameters (I/O assignment, switch setting, etc.)

The procedure for replacing a module, including re-registration of data, is as follows.

<Operation procedure when replacing the Q series C24>

(Step 1) Read all the system setting data of the Q series C24 using the Read from module function of GX Configurator-SC.

(Step 2) Save the system setting data read to the specified file using the Save file function of GX Configurator-SC (*1).

(Step 3) Turn the power supply to the Q series C24 off.

(Step 4) Dismount the cables and the module itself.

(Step 5) Replace the module and start up the module according to "4.2 Settings and Procedures Prior to Operation."

(Step 6) Read the data saved in (Step 2) back into the system and register the system setting data to the flash ROM of the Q series C24 using the Write to module function of GX Configurator-SC.

<Operation procedure when replacing the QCPU>

(Step 1) Read the PLC parameters with GX Developer from the QCPU and save them.

(Step 2) Replace the QCPU. (See the user's manual for QCPU.)

(Step 3) Register the PLC parameter saved by GX Developer back into the QCPU again.

*1 It is recommended to record and save the system setting parameters not only when replacing the module, but also when changing the system setting parameters using GX Configurator-SC.

MEMO

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5 DATA COMMUNICATION USING THE MELSEC COMMUNICATION PROTOCOL

This chapter explains an overview of the MELSEC communication protocol (hereinafter abbreviated as the MC protocol). See the following manual for a detailed explanation of the data communication functions that are available when using the MC protocol.
MELSEC-Q/L MELSEC Communication Protocol Reference Manual (SH-080008)

5.1 Data Communication Functions

The MELSEC protocol (MC protocol) is a communication system for the Q series programmable controllers. Using this protocol, the external devices can read or write device data and programs for the programmable controller CPUs via the Q series C24 or Q series Ethernet interface module.
Any external devices on which application programs can be installed and which can transmit and receive data in accordance with the MELSEC programmable controller protocol can communicate with the programmable controller CPUs using the MC protocol.

5.1.1 Accessing the programmable controller CPUs using the MC protocol

This section describes the main functions for accessing the programmable controller CPUs using the MC protocol.
(An overview of the data communication functions using the MC protocol is provided in Section 3.4).
With the exception of the on-demand function described below, the Q series C24 sends and receives data based on commands from the external devices.
Thus, the programmable controller CPU side does not require sequence programs for data communication.

(1) Data read/write

This function reads and writes data from/to the programmable controller CPU device memory of the local-station or other station on the CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 as well as the intelligent function module buffer memory.
By reading and writing data, the programmable controller CPU operation monitoring, data analysis and production management can be performed on the external device side.
Also, production directions can be executed on the external device side.

(2) File read/ write

This function reads and writes files stored in the programmable controller CPU such as sequence programs and parameter files. By reading and writing files, file management for the GX Configurator-SC and the QnACPUs of other stations can be performed on the external station side.
Also, execution programs can be changed (replaced) from the external device side.

(3) Remote control of the programmable controller CPU

This function executes remote RUN/STOP/PAUSE/latch clear/reset operations.
Remote operations of the programmable controller CPU can be performed from the external device side using the programmable controller CPU remote control function.

(4) Monitoring the programmable controller CPU

This function monitors the operating status of the programmable controller CPU and the data in the device memory.
The programmable controller CPU status and the device memory data can be sent to the external device at fixed intervals, when an error occurs in the machine equipment, or when certain conditions are satisfied.
This function reduces the data read processing load on the external device side.

(5) Sending data from the programmable controller CPU to the external device

A function for requesting data transmission from the programmable controller CPU to the external device is called the on-demand function.
Urgent data that must be forwarded to the external device can be sent as on-demand data to the external device by starting up from the programmable controller CPU.

5.1.2 Message format and control procedure for data communication

The data communication functions using the MC protocol correspond to the data communication functions using the dedicated protocol for the conventional products listed below.

- A series computer link module
- QnA series serial communication module

Therefore, the message format and control procedure are the same as when accessing the programmable controller using these conventional modules.
The external device side can access the Q series programmable controller with a program used for accessing the programmable controller via a conventional module.

(Example)

ENQ	Station No.	PC No.	Command	Message wait	Head device	No. of device points (2 characters (hexadecimal))	Sum check code
	H L	H L					H L
	0 0	0 1	Q R	0	X 0 0 0 0 4 0	0 2	7 2
05H	30H 30H	30H 31H	51H 52H	30H	58H 30H 30H 30H 30H 34H 30H	30H 32H	37H 32H

(Command message for A compatible 1C frame)

STX	Station No.	PC No.	Data for the number of device points (Number of device points × 4 characters)	ETX	Sum check code
	H L	H L			H L
	0 0	0 1	1 2 3 4 A B C D		9 8
02H	30H 30H	30H 31H	31H 32H 33H 34H 41H 42H 43H 44H	03H	39H 38H

(Response for A compatible 1C frame)

POINT

The following manual is available for performing data communication using the MC protocol.
MELSEC-Q/L MELSEC Communication Protocol Reference Manual (sold separately)

5.1.3 Programmable controller CPU setting for performing data communication

Data communication using the MC protocol is achieved by performing the GX Developer settings indicated below on a personal computer, performing the system settings by GX Configurator-SC, and registering the settings to the programmable controller.

(1) Settings using GX Developer (required)

Perform the I/O assignments and switch settings indicated in Section 4.5 and write the parameters to the programmable controller CPU where the Q series C24 is installed.

(2) System settings using GX Configurator-SC

When it is necessary to change the default values registered in the Q series C24, perform the settings as indicated in Chapter 9 and register these to the flash ROM in the Q series C24.

- MC protocol system setting
- Transmission control and others system setting

POINT
To write from the external device to the intelligent function module installed in the MELSECNET/H remote I/O station during communication using the MC protocol, check "Enable Write at RUN time" on GX Developer.

5.1.4 Support of multiple CPU system or redundant system

When the external device accesses a QCPU in a multiple CPU system or redundant system, it is possible to selectively access either a control or non-control CPU in the multiple CPU system or a control or standby system CPU or System A or System B CPU in the redundant system by specifying the target QCPU in "Requested module I/O No." of the QnA compatible 4C frame for the MC protocol.
Refer to the Reference Manual for details.
Refer to Chapter 2 of this manual for the system configuration.

(Example) When multiple CPU No.1 is specified

ENQ	Frame ID No.	Station No.	Network No.	PC No.	Requested module I/O No.	Requested module station No.	Self-station No.	Command	Sub command	Device code	Head device	Number of device points	Sum check code
	H L	H L	H L	H L	H — — L	H L	H L	H — — L	H — — L		H — — — — L	H — — L	H L
	F 8	0 5	0 7	0 7	0 3 E 0	0 0	0 0	0 4 0 1	0 0 0 1	X *	0 0 0 0 4 0	0 0 0 5	3 6
05H	46H 38H	30H 35H	30H 37H	30H 37H	30H 33H 45H 30H	30H 30H	30H 30H	30H 34H 30H 31H	30H 30H 30H 31H	58H 2AH	30H 30H 30H 30H 34H 30H	30H 30H 30H 35H	33H 36H

(Command massage of the QnA compatible 4C frame format 1)

REMARKS

- When using the Q series C24 in a multiple CPU system, it is necessary to specify the QCPU that controls the Q series C24 (hereinafter referred to as the control CPU) using GX Developer.
- It is also possible to mount a Q series C24 of function version A in a multiple CPU system. In this case, it is only possible to access the control CPU (CPU No.1).
- It is only possible to access the control CPU if data is communicated by means of frames other than the QnA compatible 4C frame.
- When the Q series C24 is mounted on the extension base unit of the redundant system, the access target (control system CPU or standby system CPU and system A CPU or system B CPU) that can be specified varies depending on each command.
  For details, refer to QnPRHCPU User's Manual (Redundant System).

5.1.5 Support for the QCPU remote password function

This section explains an overview of the remote password function when a remote password is set for the Q series C24 mounted to a QCPU.
See the User's Manual (Application) for a detailed explanation.

(1) Checking remote passwords

If the following items are set to the QCPU using GX Developer, the Q series C24 performs a remote password check whenever an external device accesses the programmable controller using the modem function of the Q series C24.

(a) Setting using GX Developer
- When the remote password is set on the QCPU with the Q series C24.
- When the Q series C24 is set to be subject to the remote password check.

(b) Access in which the remote password is checked
The remote password is checked when the following access is attempted. Access attempts to all programmable controllers of the local station (the local station with the Q series C24 and other stations accessed via the local station) are subject to the remote password checking.

(The remote password is checked for validity of access to a programmable controller.)
- Data communication using the MC protocol
- Access to the programmable controller using GX Developer

＊ The remote password is not checked in data communication using the non procedure, bi-directional, or pre-defined protocol.

(c) Remote password to be checked
The check is performed against the remote password set to the local station QCPU with the Q series C24.

＊ Access to the specified station is allowed if the remote password specified by the user and the remote password set to the QCPU match when accessing.

(2) Data communication procedure

1) Initialize the modem.
2) Connect the line from the external device.
3) Unlock (cancel) the remote password of the QCPU belonging to the station with the Q series C24 mounted from the external device via the dedicated command for communication using the MC protocol.
4) Initiate the data communication between the external device and programmable controller using the MC protocol.
5) Disconnect the modem line from the external device side when completing the data communication using the MC protocol.
   The remote password is automatically locked when the modem is disconnected.

REMARKS

The remote password should be set to a QCPU using GX Developer in order to use the remote password function of QCPU.

- Unlocking the remote password is possible only for the QCPU of the local station with the Q series C24.
  It is impossible to unlock the remote password for the QCPU of other stations.
  See the Reference Manual for the command for unlocking the remote password.
- When accessing the programmable controller using GX Developer, the remote password should be unlocked when starting the online operation.

(3) Q series C24 setting and monitoring function when using the QCPU remote password function

(a) Modem function system setting by GX Configurator-SC

1) Remote password mismatch notification count designation
   Designate the number of times before notification when a remote password disagreement occurs at the unlock processing by the user/external device after the line is connected.
   The Q series C24 automatically disconnects the line if more remote password disagreements occur than the number of times designated by this value.
2) Remote password mismatch notification accumulated count designation
   Designate the number of times before notification when remote password disagreements occur at the unlock processing by the user/external device after the startup of the Q series C24.
   The ERR. occurrence (XE/XF) and the ERR LED turn on if remote password disagreements occur more than the number of times designated by this value (the line is not disconnected).
   * The user can clear the cumulative value counted by the Q series C24 at an occurrence of remote password disagreement using either one of the methods below:
     - Set the cumulative number of abnormal completions of unlock processing to "0" in the modem function monitor/test screen of GX Configurator-SC.
     - Write "0" to the storage area corresponding to the Accumulated count of unlock process abnormal completion processing (address: 8956 ($22FC_H$)).

(b) Modem function monitor/test by GX Configurator-SC

It is possible to monitor the setting values for the remote password and the number of occurrences up to the present. such as the designation of the number of times before notifying an unmatched remote password and the current number of occurrences.

* It is possible to set each monitor value to "0".

Monitored items in the “modem function monitor/test” screen	Buffer memory address
Remote password mismatch notification count designation	8204 ($200C_H$)
Remote password mismatch notification accumulated count designation	8205 ($200D_H$)
Accumulated count of unlock process normal completion	8955 ($22FB_H$)
Accumulated count of unlock process abnormal completion	8956 ($22FC_H$)
Accumulated count of lock process based on circuit disconnection	8959 ($22FF_H$)

5.2 Utilizing the MX Component

When an external device is a personal computer, use separately sold communication support tools (MX Component). This allows a communication program for the external device to be created, regardless of MC protocol's transmitting/receiving procedure. For details on MX Component, refer to Appendix 7 and the operating manual of MX Component.

6 DATA COMMUNICATION USING THE NON PROCEDURE PROTOCOL

Data communication using the non procedure protocol is a function for sending and receiving data between a programmable controller CPU and an external device using the message format and transmission control procedure specified by the user.
Data can be transferred using the non procedure protocol when it is necessary to perform data communication using the protocol for external devices such as a measuring instrument and a bar code reader. In that case, transmission/receive data processing can be simplified by using the communication functions with the user frames described in the User's Manual (Application).

This chapter explains the basic transmission and reception methods when performing data communication using the non procedure protocol.
Follow the procedure described in this chapter to create sequence programs for sending and receiving data for the programmable controller CPU.
For details on the additional functions listed below for data communication using the non procedure protocol, see the separate User's Manuals (Application).

- Sending/receiving data using user frames
- Monitoring the programmable controller CPU (automatic information function)
- Switching modes from the programmable controller CPU
- Reading received data using interrupt programs
- Sending/receiving data using transparent code designation
- Sending/receiving data using ASCII data (ASCII-BIN conversion)
- Controlling half-duplex communication

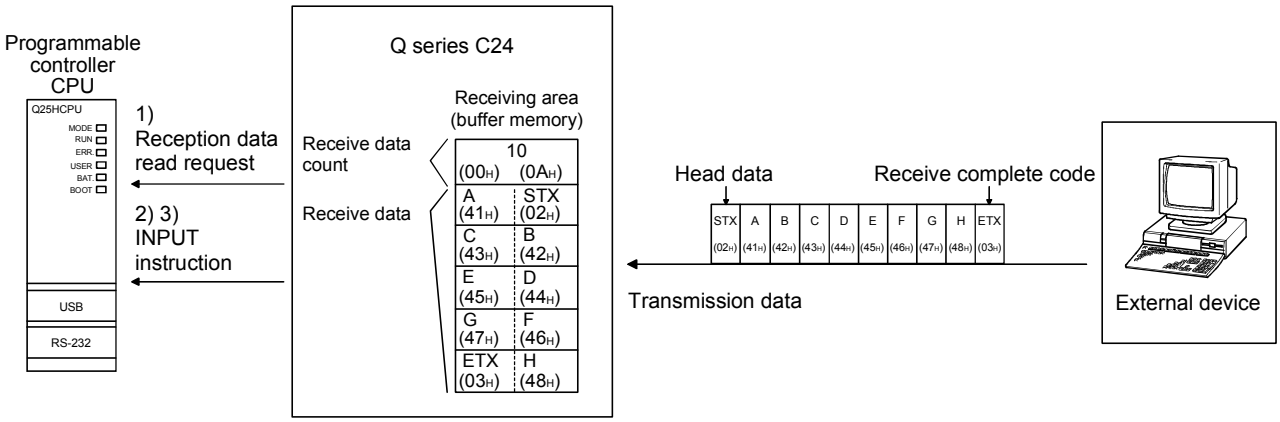
6 - 1

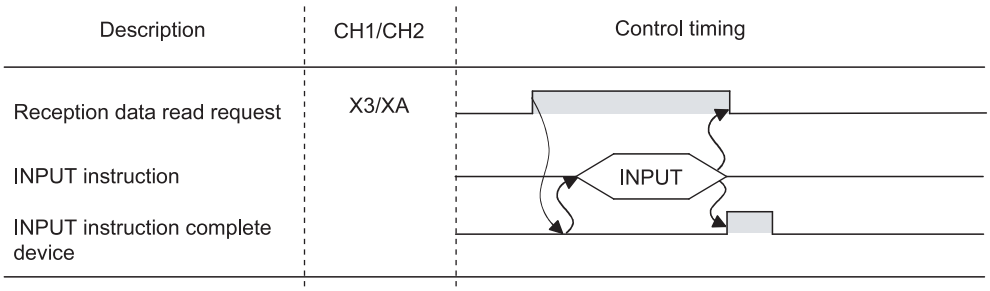
6.1 Data Reception from the External Device

This section explains data reception from the external device.
There are two methods for receiving data: the "reception via receive complete code" for receiving variable length messages, and the "reception via received data count" for receiving fixed length messages. The receive complete code and received data count used for data reception can be changed to any setting values chosen by the user using GX Configurator-SC.

6.1.1 Receiving methods

The following shows the methods for receiving data in any format using the non-procedure protocol.
There are two methods for receiving data: the "reception via receive complete code" for receiving variable length messages, and the "reception via received data count" for receiving fixed length messages. The receive complete code and received data count used for data reception can be changed to any setting values chosen by the user using GX Configurator-SC.





1) When data is received from the external device using either "reception via receive complete code" or "reception via received data count" method, the reception data read request (X3/XA) turns ON.
2) Control data is stored in the device designated with the INPUT instruction.
3) When the INPUT instruction is executed, receive data is read from the reception data storage area of the buffer memory.

(1) Data reception by receive complete code (for variable length reception)

(a) This method is used to send data by adding the receive complete code set in the Q series C24 at the complete of the message to be sent from the external device.

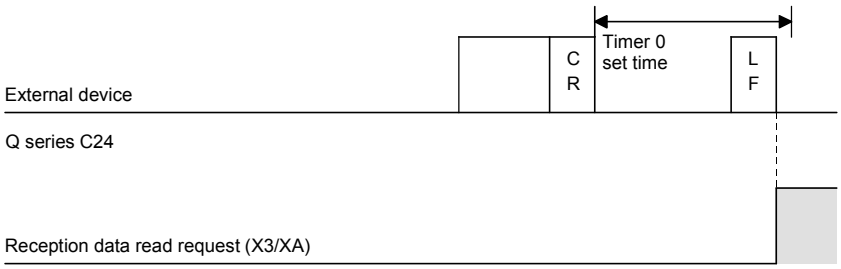
(b) When the Q series C24 receives the receive complete code data preset in GX Configurator-SC by the user, it sends a receive data read request to the sequence program.
The read request from the Q series C24 allows the sequence program to read the receive data up to the receive complete code received from the external device.

(c) The receive complete code can be changed to match the specifications of the external device. An arbitrary 1-character (1-byte) code within the 00_H to FF_H range can be designated.

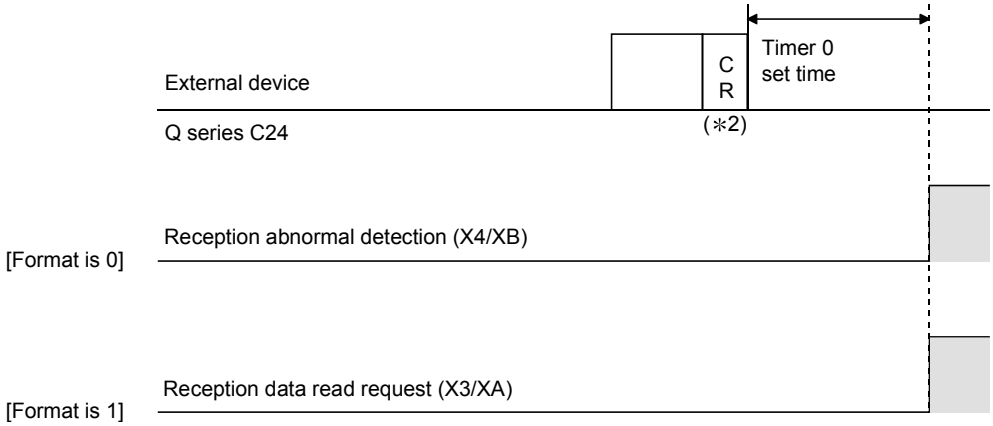
(d) The Q series C24 issues a receive data read request to the programmable controller CPU as follows, according to the set value of the receive end code.

1) When receive complete code not changed (Default value: $0D0A_H$)
(CR+LF is added to the end of the message and sent from the external device.)

- If LF is received within the time set in the no-reception monitoring time (timer 0) after CR is received, the Q series C24 stores the receive data up to CR+LF to the buffer memory receive data storage area and turns on the reception data read request (X3/X4) to the programmable controller CPU.



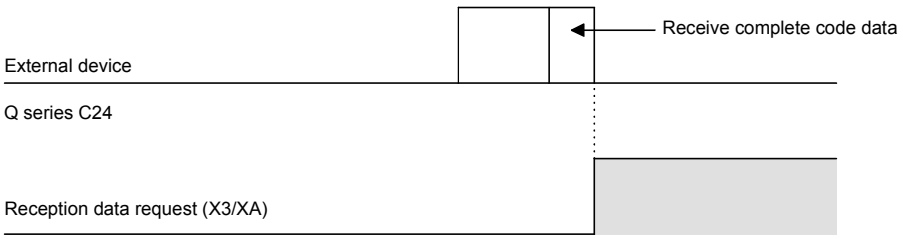
- If the next data (LF, etc.) is not received within the time set in the non reception monitoring time (timer 0) after CR is received, the Q series C24 stores the received data up to CR to the buffer memory receive data storage area and turns on the following signals to the programmable controller CPU.
  When non procedure and non reception monitoring time format is 0:
  Reception abnormal detection (X4/XB)
  When non procedure and non reception monitoring time format is 1:
  Reception data read request (X3/XA) ∗1



∗1 In non procedure protocol, a message is received by the increase in non reception monitoring time (timer 0) if the received complete code and the received data count are not decided.
For the non procedure protocol at the non reception monitoring time format, see the User's Manual (Application).

∗2 CR is included as 1 byte of data included in the message.

2) When the receive complete code is changed and an arbitrary code is designated (00□□H designated)
(User defined receive complete code data is added to the end of the message and sent from the external device).
When the Q series C24 receives the receive complete code data changed by the user, it stores the receive data up to the receive complete code to the buffer memory receive area and turned on the reception data read request (X3/X4) to the programmable controller CPU.



3) When receive complete code not designated (FFFFH designated)
Reading by received data count is enabled.
See (2) for a description of reading by received data count.

(2) Reception by received data count (For fixed length reception)

(a) This method is used to receive messages of the same length (size) from the external device every time.

(b) When the Q series C24 receives data of the received data count preset in GX Configurator-SC by the user, it sends a reception data read request to the sequence program.
When the sequence program receives the read request from the Q series C24, it reads data up to the received data count received from the external device.

(c) The received data count default value is set to 511 (words). However, it can be changed within the size of the receive data storage area depending on the data contents exchanged with the external device.

POINT

(1) When the receive complete code and received data count are set to GX Configurator-SC, both become valid.
In this case, if the Q series C24 receives the receive complete code before receiving data that are equivalent to the receive data count, Reception data read request (X3/XA) is set to ON.

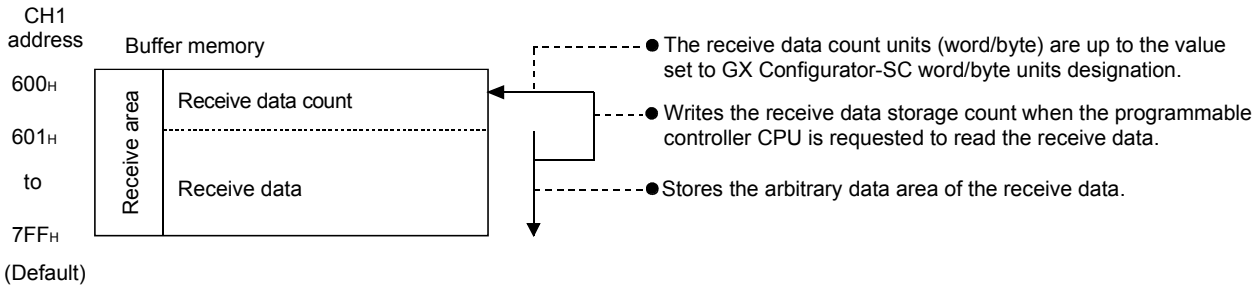
(2) For details on how to change the receive complete code and received data count, see Section 9.4.7.

6.1.2 The receive area and the received data list

The following shows the list of the receive area and the receive data for performing data reception using the non procedure protocol.

(1) Receive area

The receive area is a memory area for storing the data received from the external device and the receive data count in order to read the receive data for the programmable controller CPU. By default, the receive area is assigned to addresses 600H to 7FFH (CH1 side) and A00H to BFFH (CH2 side).


CH1 address
Buffer memory
600H
601H
to
7FFH
(Default)
Receive area
Receive data count
Receive data
The receive data count units (word/byte) are up to the value set to GX Configurator-SC word/byte units designation.
Writes the receive data storage count when the programmable controller CPU is requested to read the receive data.
Stores the arbitrary data area of the receive data.

POINT

(1) The position and size of the receive area in the buffer memory can be changed with the GX Configurator-SC in accordance with the specifications of the external device and the receive data length. (See Section 9.4.7.)

(a) When changing the position and size of the receive area in the buffer memory with GX Configurator-SC, specify as follows:

1) Receive buffer memory head address designation
Designate the starting address for the area to be used as the receive area in the user-definable area (address: 400H to 1AFFH, 2600H to 3FFFH).

2) Receive buffer memory length designation
Designate by address the length of the area (0001H to 1A00H) to be used as the receive area in the user-definable area (address: 400H to 1AFFH, 2600H to 3FFFH).

(b) When changing the position and size of the receive area in the buffer memory, if any of the functions below are used concurrently, make sure that the addresses of the receive area do not overlap with the buffer memory addresses assigned for storing transmission/receive data with the functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Pre-defined protocol function (transmission/reception data storage area)
6) Communication data monitoring function

(2) When sending data from the external device to the Q series C24, one of the following two adjustments should be made so that the relationship below is maintained.

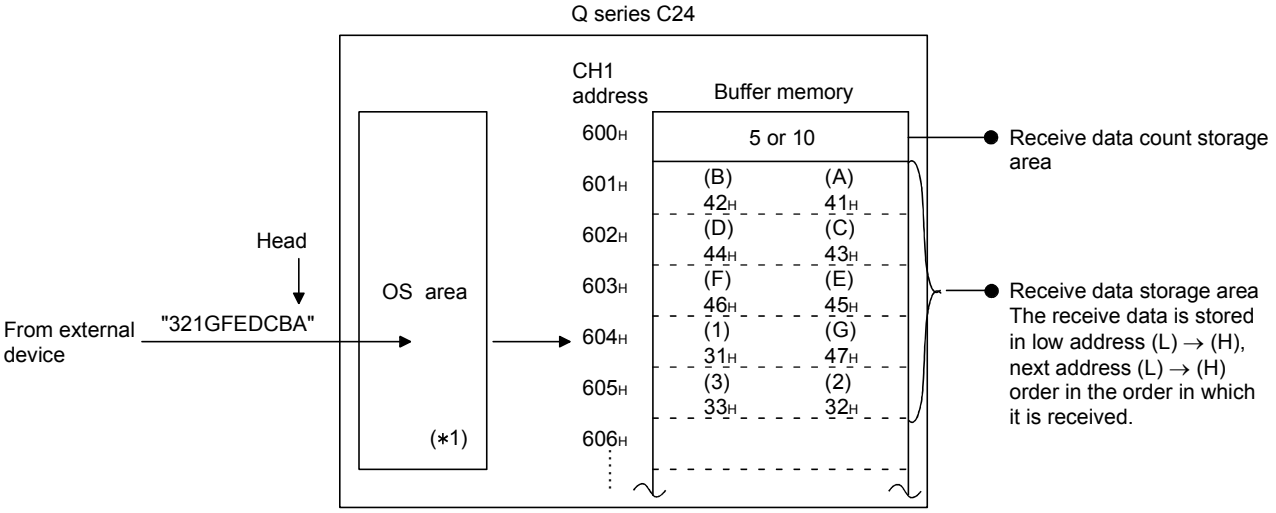
1) Reduce the transmission data size.
2) Increase the receive area.
Receive data storage area $\geqq$ Size of data sent from the external device

(2) Receive data list

The following describes the data list when data received from an external device is stored to the receive area.

1) The receive message is stored to the Q series C24 buffer memory (receive data storage area).
2) The data is stored to the receive data storage area in low address (L) → (H), next address (L) → (H) order.
   * Under the following conditions, when the receive data count is an odd byte, 00H is stored in the upper byte of the final data storage position:
     • When the unit for the received data count is designated in bytes.
     • When data reception is performed using the receive complete code.

   (Example) When receive arbitrary data area "ABCDEFG123" was stored (The receive area is the default value.)



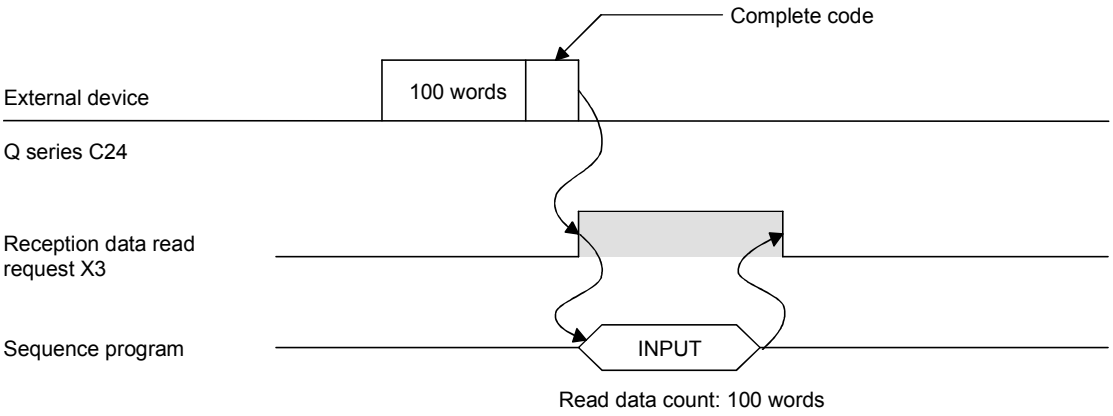
*1 The OS area of the Q series C24 shown in the above diagram is the memory (8448 bytes) that temporarily stores the data to be received while a request for the reading of the receive data is being made to the programmable controller CPU.
(The user cannot read the receive data in the OS area).
When the sequence program finishes reading the receive data in the buffer memory in response to the read request, the receive data in the OS area, and any succeeding receive data, is stored successively in the receive area of the buffer memory when the next read request is issued.
Also, when the OS area's free space, which stores the receive data, is reduced to 64 bytes default value or less, a request to discontinue data reception from the external device is issued by the following transmission control (the RS(RTS) signal does not turn OFF):
• When DTR control is set, the ER(DTR) signal turns OFF.
• When DC1/DC3 control is set, DC3 is sent.
When there is no more free space in the OS area to store receive data, an SIO error occurs and the SIO information bit in the LED ON status and communication error status (address: 201H/202H) in the buffer memory turns ON. In that case, succeeding receive data is discarded until a free space becomes available in the OS area.
* For more details on the transmission control, see the User's Manual (Application).

REMARKS

(1) Data reception when:
Receive data storage area > Receive data length

The following control is performed.

(Example) When the receive area for the CH1 side interface is located at addresses 600H to 7FFH (default values) and data of 511 words or less is received by the CH1 side interface.

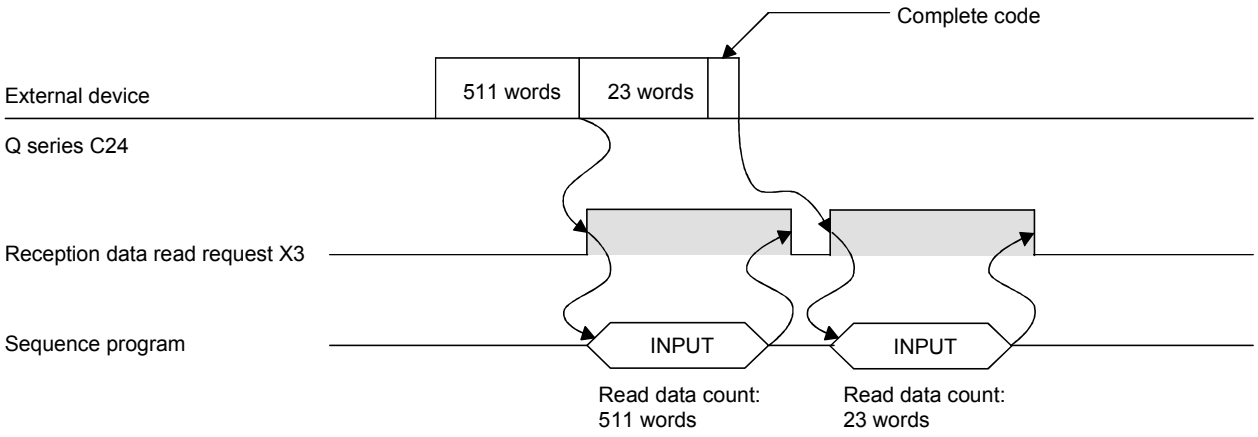


(2) Data reception when the receive data storage area is smaller than the receive data length

Since the following control is performed, data link processing is required in the sequence program.

1) Reception using the complete code

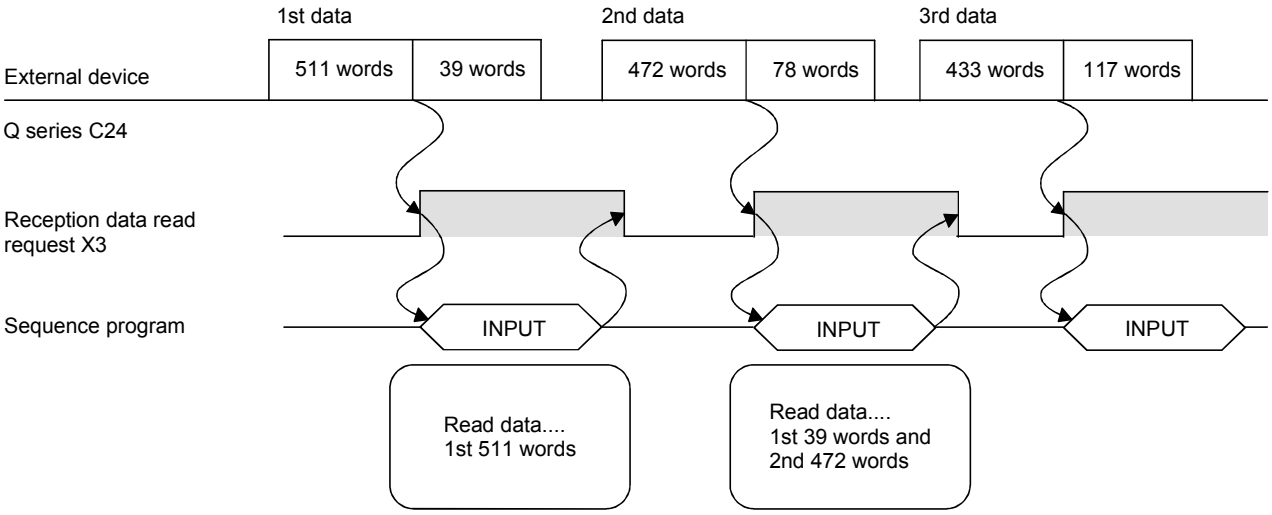
(Example) When the receive area for the CH1 side interface is located at addresses 600H to 7FFH (default values), and data of 534 words is received by the CH1 side interface.



2) Reception by received data count
If a specified receive data count is too large for the receive data storage area, Receive buffer memory length (address: A7H/147H, default: 512 words) minus 1 is used as the receive data count instead.

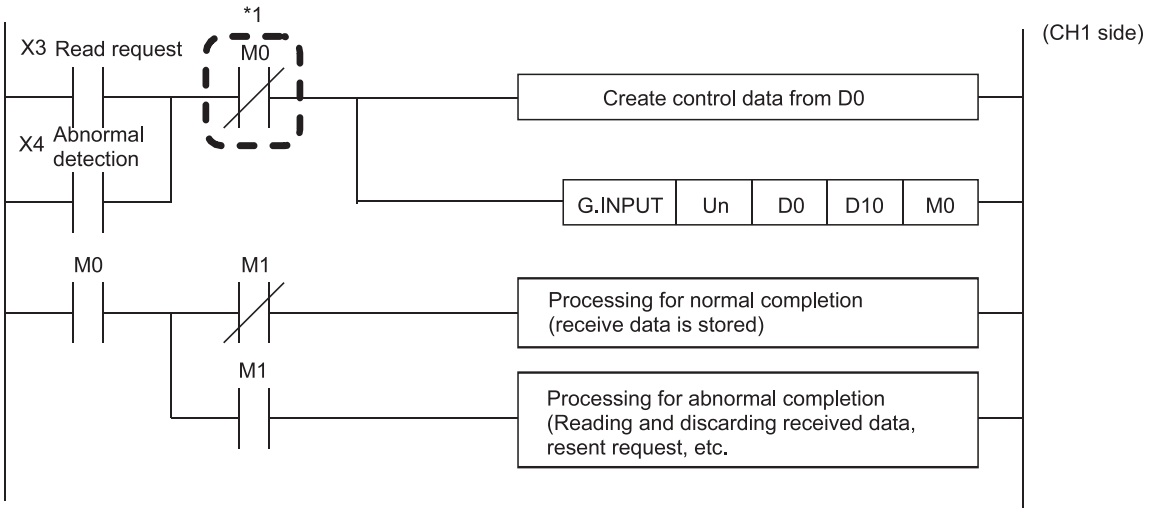
(Receive data storage area) > (Data length received from external device)

(Example) When 550 words of data is received through the CH1 interface in three parts when the CH1 interface receive area consists of addresses 600H to 7FFH (default value)

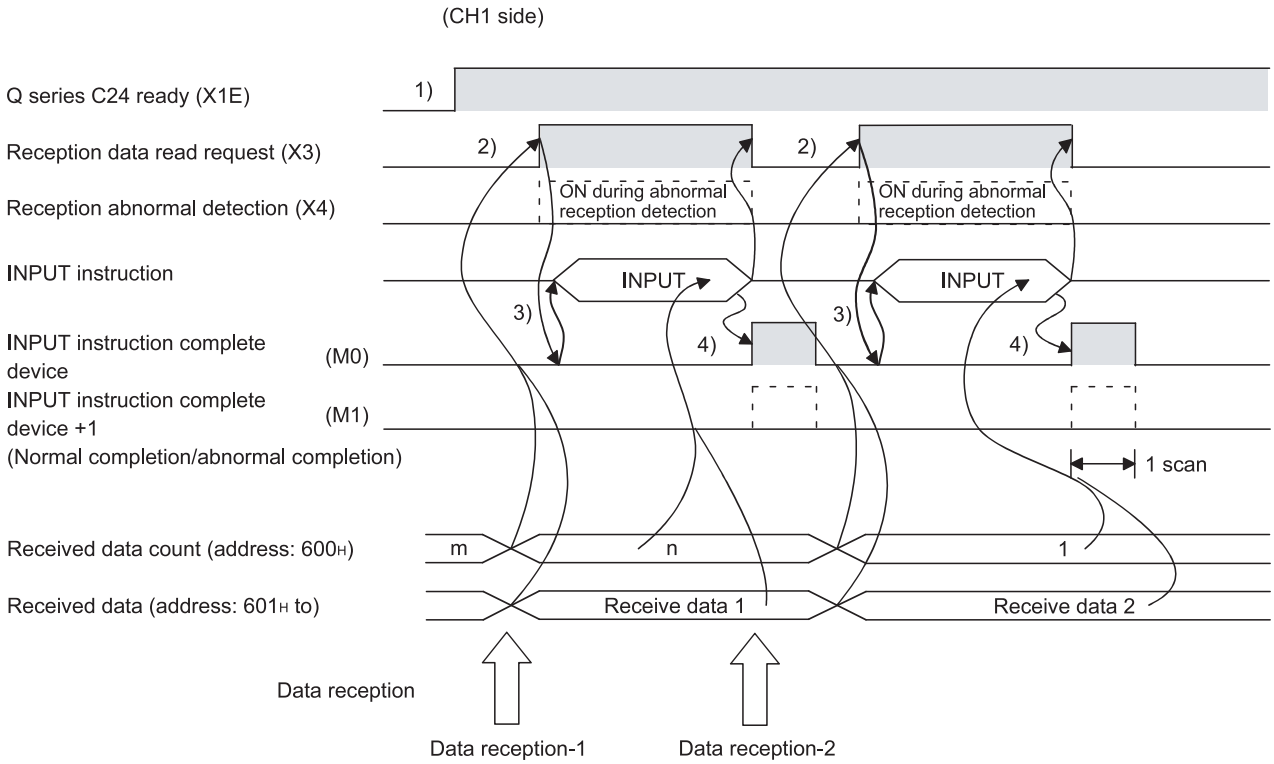


6.1.3 Sequence program for data reception

This section explains the sequence program for data reception.
For details on the INPUT instruction for data reception, see Chapter 10.



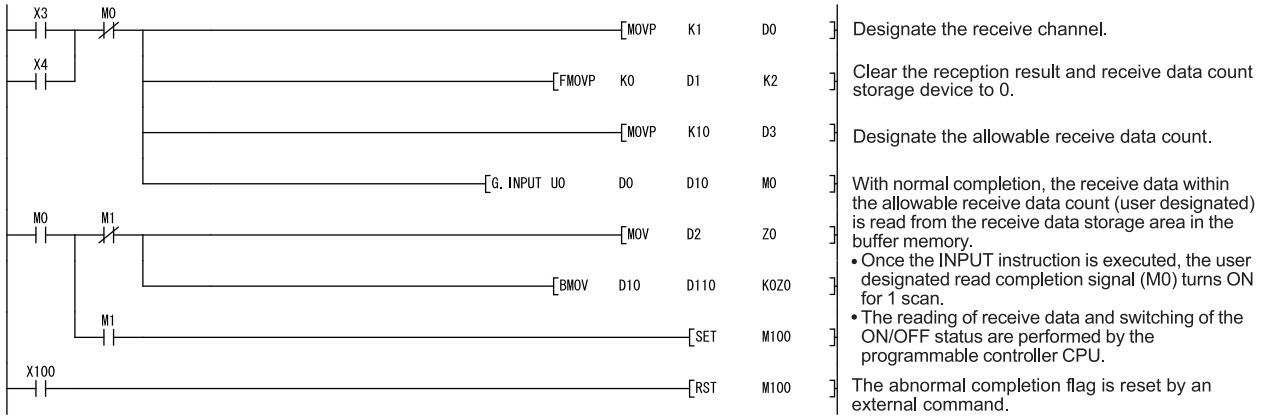
∗1 When the completion device is off, execute the INPUT instruction.
If the INPUT instruction is executed when the completion device is on, data may not be received properly.

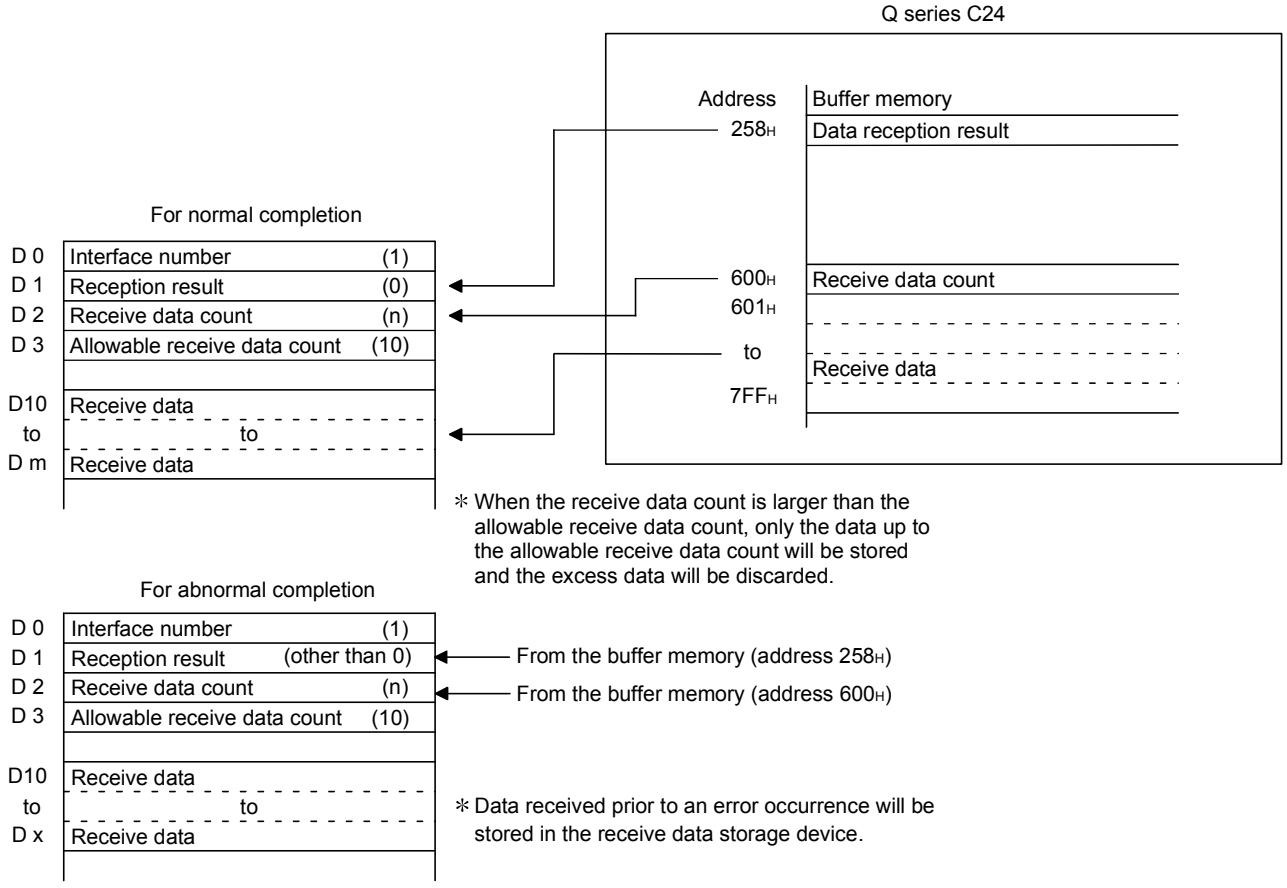


1) Start the self-station programmable controller CPU.
   The values specified with GX Developer are stored in the Q series C24.
2) When the amount of data specified by the received data count or data containing the receive complete code is received from the external device, the reception data read request (X3) turns ON.
3) After the control data for the INPUT instruction is stored in the device, the sequence program executes the INPUT instruction and reads the receive data. Before executing the INPUT instruction, check that the INPUT instruction complete device (M0) is off.

4) The device completing the INPUT instruction turns ON when the reading of receive data is completed.
When the complete device + 1 (abnormal completion signal) turns ON, the error code is stored in the control data completion status (S1 + 1).

(Program example)
When the Q series C24 I/O signals are from X/Y00 to X/Y1F:


X3
M0
MOVP K1 D0
Designate the receive channel.
X4
FMOVP K0 D1 K2
Clear the reception result and receive data count storage device to 0.
MOVP K10 D3
Designate the allowable receive data count.
G. INPUT U0 D0 D10 M0
With normal completion, the receive data within the allowable receive data count (user designated) is read from the receive data storage area in the buffer memory.
• Once the INPUT instruction is executed, the user designated read completion signal (M0) turns ON for 1 scan.
• The reading of receive data and switching of the ON/OFF status are performed by the programmable controller CPU.
M0
M1
MOV D2 Z0
BMOV D10 D110 K0Z0
M1
SET M100
X100
RST M100
The abnormal completion flag is reset by an external command.


Q series C24
Address
Buffer memory
258H
Data reception result
600H
601H
Receive data count
to
7FFH
Receive data
For normal completion
D 0 Interface number (1)
D 1 Reception result (0)
D 2 Receive data count (n)
D 3 Allowable receive data count (10)
D10 Receive data
to to
D m Receive data
* When the receive data count is larger than the allowable receive data count, only the data up to the allowable receive data count will be stored and the excess data will be discarded.
For abnormal completion
D 0 Interface number (1)
D 1 Reception result (other than 0)
D 2 Receive data count (n)
D 3 Allowable receive data count (10)
D10 Receive data
to to
D x Receive data
From the buffer memory (address 258H)
From the buffer memory (address 600H)
* Data received prior to an error occurrence will be stored in the receive data storage device.

POINT

(1) Receive data can also be read using interrupt programs.
For more details on reading receive data with interrupt programs, see the User's Manual (Application).
Note that if the reading of data received from the same interface is to be performed, it is not possible to combine the reading of data received by the main program and reading of data received by the interrupt program.
Accordingly, use one or the other of the above programs to read the data received.

(2) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 10.)

(3) More than one INPUT instruction cannot be executed simultaneously.
Execute the next INPUT instruction only after the execution of the first INPUT instruction is completed.

(4) When the communication data count is set in word units, and if the received data count is an odd byte when requesting the reading of received data to the programmable controller CPU, the receive data count is processed as follows:
Receive data count = Receive data byte count/2 ⋯ Fractions following the decimal point are rounded up
Also, 00_H is stored in the higher byte of the final data storage position in the receive area where receive data is stored.

6.1.4 Receive data clear

For the data reception by a non procedure protocol, if the transmission of data from a transmitting device is interrupted due to trouble occurring, it may be necessary for the data received up to the present time are cleared in the receiving device and for the data to be received again from the start.

The methods for clearing reception data in the Q series C24 are listed below. Either method may be used to clear received data as necessary.

1) Clear the reception data by the dedicated instruction "CSET".
2) Write to/read from the reception data clear request (address: A8H/148H). (FROM/TO instruction)
3) Clear the reception data by GX Configurator-SC (see Section 9.7).

REMARKS

When transmitting data to an external device from the Q series C24, do not execute a clear request of the reception data shown in this section.
If a reception data clear request is executed when transmitting data to an external device, The Q series C24 stops data transmission and terminates the dedicated instruction for transmission abnormally. (The transmission completed signal does not go ON.) If a reception data clear request is executed during data reception, the data received up to that point are cleared.

(1) Receive data clear processing

The Q series C24 performs the following procession when the receive data clear is performed.

- The data received up to that point can be ignored.
- The receive data count up to that point is "0". (The receive area in the buffer memory is not initialized.)
- Set to the status prior to the start of data reception.

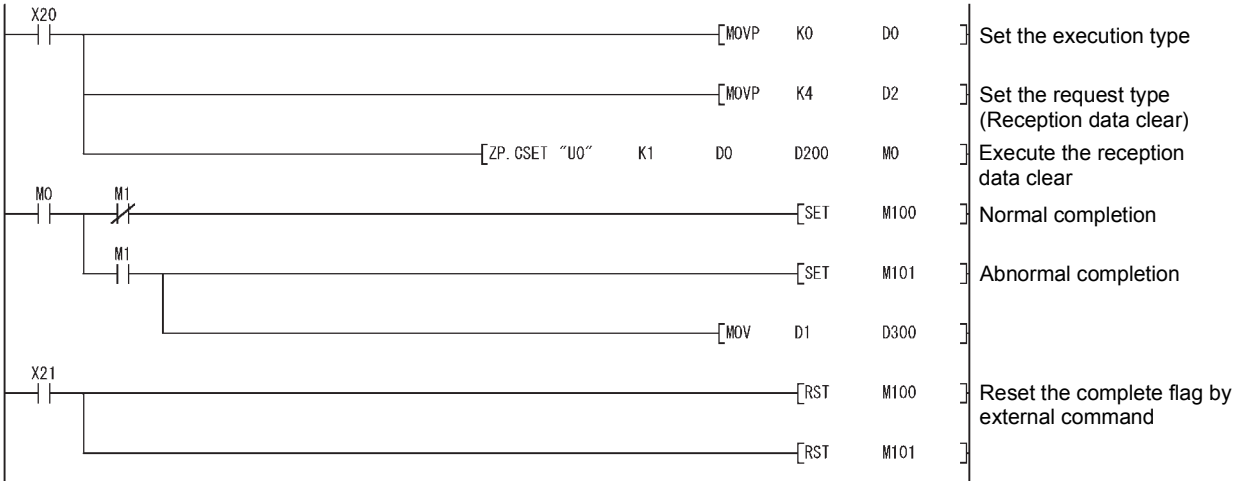
(2) Procedure for clearing the reception data by the dedicated instruction "CSET"

This instruction clears the reception data up to the present without interrupting the data transmission processing.

(Procedure for clearing) ··· In case of the CH1 side interface

1) Execute the CSET instruction
   If the CSET instruction is executed while the reception data read request (X3/XA) or reception abnormal detection signal (X4/XB) is turned on, the CSET instruction is kept waiting until the signal is turned off.
2) The reception data clear processing is executed at the OS area of the Q series C24 (see Section 6.1.2).

The following is a program example of clearing the reception data by the dedicated instruction "CSET".



(3) Receive data clear procedure using the FROM/TO instruction

Write and read the receive data clear request (address: A8H/148H) using the procedure described below.
When resuming data communications with an external device, resume it after completing the reception data clear processing with the Q series C24.

Depending on the data communications system, it may be necessary to restart data communications with the external device after notifying the external device from the programmable controller CPU that resumption of communications is possible.

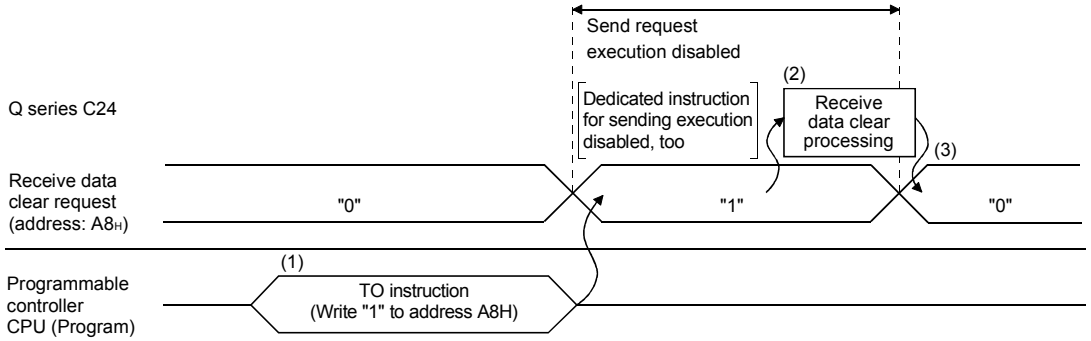
(Clear Procedure)· ··When the CH1 side interface is used.

(1) While none of receiving, sending, and receive data clearing is being performed, with the TO instruction, "1" is written to Receive data clear request (address: A8H).
(2) Receive data clear processing is performed for the Q series C24's OS area (See Section 6.1.2).
(3) When receive data clear processing is completed, receive data clear request (address: A8H) becomes "0".

The following page shows an example of a program to clear receive data with the FROM/TO instruction.
Create a program that contains the contacts (user flags, etc.) indicating the following statuses in the TO instruction.

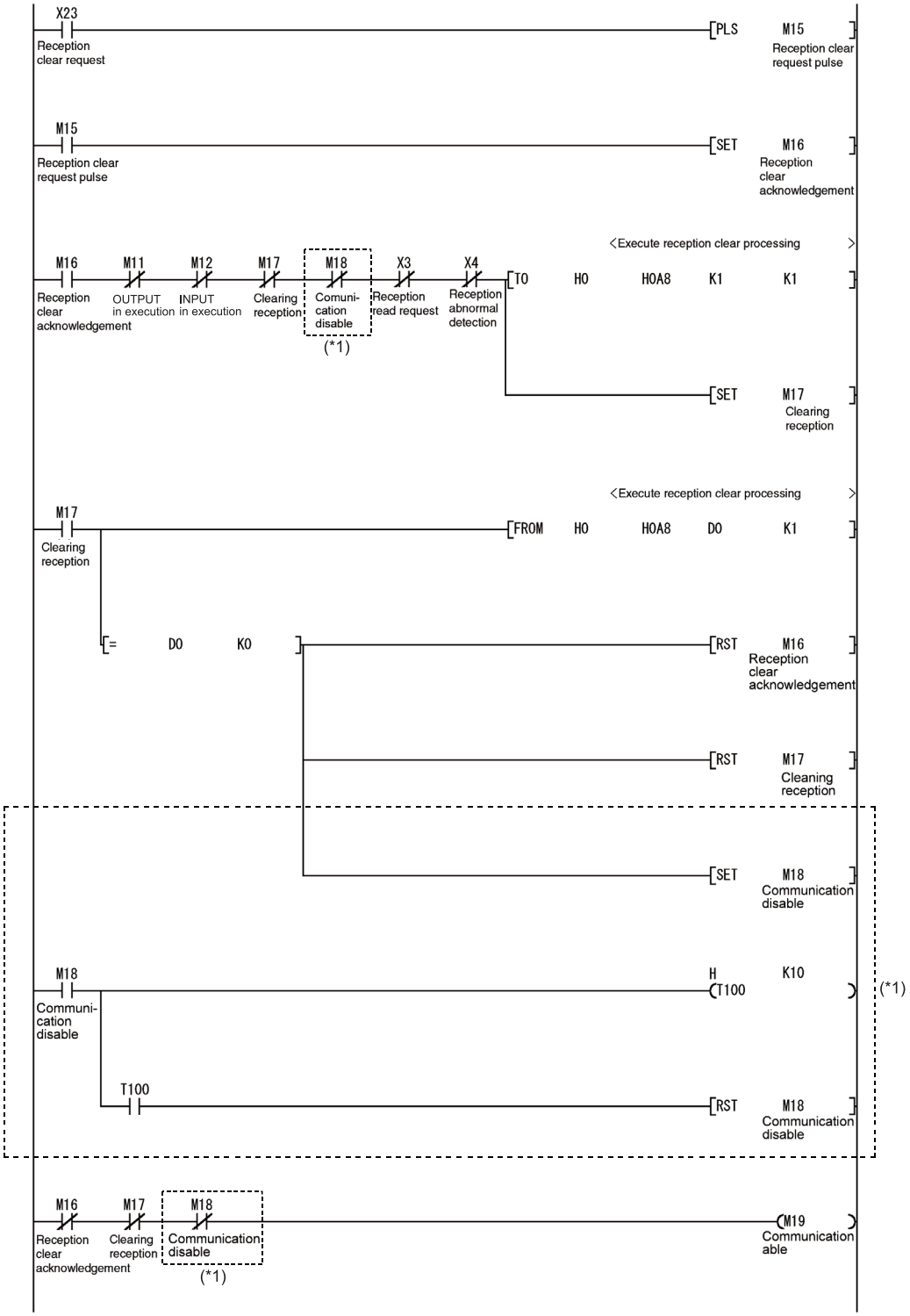
- Contacts indicating that the reception data read request (X3/XA) and reception abnormal detection (X4/XB) are OFF
- Contact indicating that no dedicated instruction (OUTPUT/PRR/INPUT) is currently being executed
- Contact indicating that reception data clear processing is not currently being performed

∗1 When the function version A Q series C24 is used, resume data communications a further 100 ms after the receive data clear request (address: A8H/148H) changes from a "1" to a "0".


Send request
execution disabled
(2)
Dedicated instruction
for sending execution
disabled, too
Receive
data clear
processing
(3)
Q series C24
Receive data
clear request
(address: A8H)
"0"
"1"
"0"
(1)
Programmable
controller
CPU (Program)
TO instruction
(Write "1" to address A8H)

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(Example) The following is an example program for clearing received data with the FROM/TO instructions while send/receive processing is performed using dedicated instructions (OUTPUT/INPUT).



*1 Add the dotted line portion to the sequence program when the function version A Q series C24 is used. (Carry out communications when M19 is ON.)

6.1.5 How to detect reception errors

This section explains how to detect errors that may occur when receiving data from the external device.

The following items are considered as the primary causes of errors that may occur during data reception.

Cause of reception error	Reference section
A transmission error occurred due to noise.	—
A timeout for the no-reception monitoring (timer 0) occurred.	User's Manual (Application)
Received data that could not be converted using the ASCII-BIN conversion.	
Received data larger than the size that could be stored in the OS area of the Q series C24.	Section 6.1.2

(1) Confirmation using the sequence program

(a) Detecting the occurrence of a reception error

1) The following device and input signals turn ON.
   - INPUT instruction complete device + 1
   - Reception abnormal detection (X4/XB)
   - ERR. occurrence (XE/XF)
2) The reception error code can be checked using the INPUT instruction control data ((S1) + 1).
   Or, it can be checked by reading the data reception result (address: 258H/268H).
   For details on how to check the error code contents and take corrective actions, see Chapter 11.

(b) How to turn off the ERR LED and clear the error code (see Section 11.1.2.)

1) To turn off only the ERR LED, write "1" to the Communication error clear request and to turn LED off (addresses: 0H/1H).
2) To turn off the ERR LED and clear the error code, turn ON the ERR. clear request (YE/YF).

(Example) To perform the ERR LED OFF and the error code clear on the CH1 side



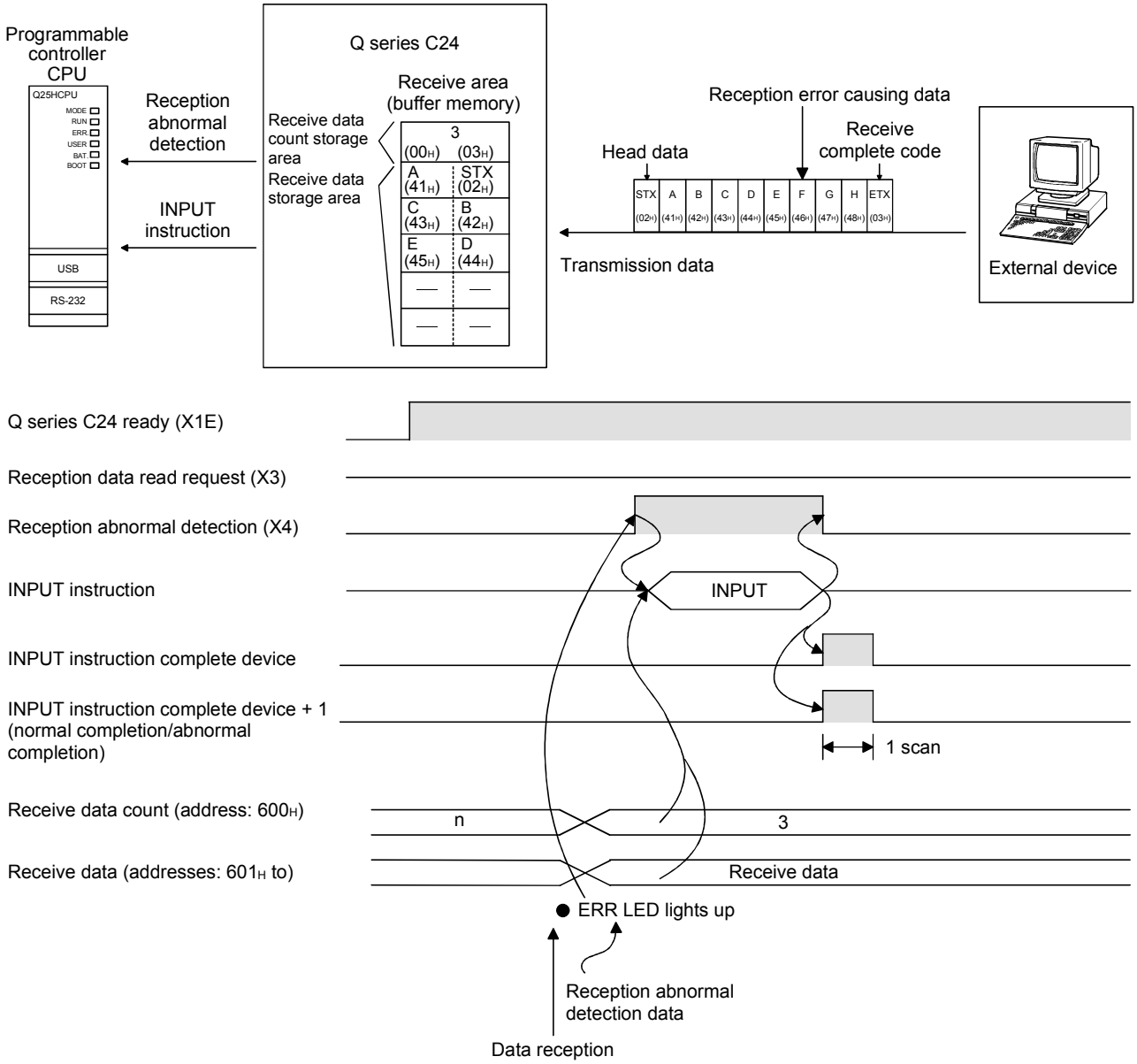
(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a transmission error, the ERR LED lights up. (See Chapter 11.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 9.6.3 and 9.6.5.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 9.6.10.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 9.6.5.)
   - GX Developer buffer memory monitor function (monitors addresses 258H/268H)

(3) Receive data when a reception error occurs

(a) Storing receive data
The receive data for which an error was detected is discarded and only the normally received data is stored in the Q series C24.
Thus, there may be missing data among the data that has been read to the programmable controller CPU when a reception error occurs.

(b) Reading receive data
When receive data is read to the programmable controller CPU by turning the reception abnormal detection (X4/XB) ON, the data that was normally received prior to the error detection is read. Read and discard receive data as needed.



* When the data from "G" to in the reception message shown in the figure above is received normally, the data is stored in the Q series C24 OS area.
The receive data stored in the OS area will be read to the programmable controller CPU in the succeeding read operation.

6.1.6 Received data count and receive complete code settings

The following default values have been set for the received data count and receive complete code that are used for data reception with the non procedure protocol.
The received data count and the receive complete code setting value can be changed by the sequence program before data receive processing. (Refer to Section 6.1.6(3))
The default value can be changed by Non procedure system setting of GX Configurator-SC. (Refer to Sections 9.4.5 and 9.4.7.)

Setting data	Default value	Allowable range	Buffer memory address where the setting value is stored	Remarks
Received data count	511 (1FF$_H$)	Less than the size of the receive data storage area	A4$_H$/144$_H$	Unit is in accordance with the word/byte units designation
Receive complete code	0D0A$_H$ (CR, LF)	0000$_H$ to 00FF$_H$	A5$_H$/145$_H$	When any code is set
		FFFF$_H$		When there is no receive complete code

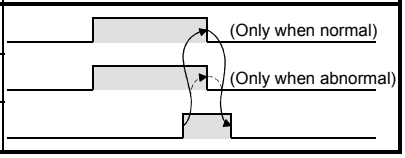
REMARKS

Other than through the setting using GX Configurator-SC or the TO instruction at the startup of the Q series C24, the received data count and receive complete code setting values can be changed even after data communication has started if the timing is as shown in the chart below.
The following describes the procedure for changing setting values for data reception via the non procedure protocol after the start of data communication, and for the resumption of data reception processing. Specifically, the module restrictions are explained, along with the timing and procedure for changing the setting values.

(1) Data receiving method

Reception using a dedicated instruction (INPUT) or an interrupt program (*1) cannot be performed. (Transmission using a dedicated instruction (OUTPUT) can be performed.) Data must be received using the FROM instruction in the main program.
The following describes the I/O signals. (A program example is shown on the following page.)

*1 For details on the data reception using interrupt programs, see the User's Manual (Application).

	I/O signal		Signal name	Device that turns ON/OFF		Timing
	CH1 side	CH2 side		CPU	Q series C24	
Reception	X3	XA	Reception data read request		○	
	X4	XB	Reception abnormal detection		○	
	Y1	Y8	Reception data read completion	○		

POINT

When the reception abnormal detection (X4/XB) turns ON, read the error code from the buffer memory below, and then check the type of error and take corrective action based on the information found in Chapter 11.

- Data reception result (addresses: 258$_H$/268$_H$)

(2) Setting values that can be changed

Of the initial settings from GX Configurator-SC stored in the buffer memory, only the following setting values can be changed after data communication has started.

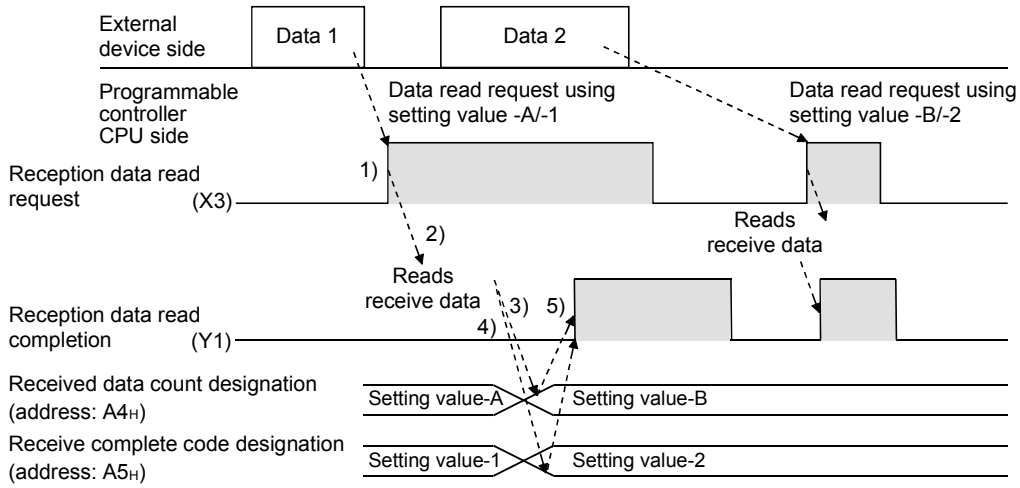
- Received data count designation (addresses: A4H/144H)
- Receive complete code designation (addresses: A5H/145H)

(3) Timing and procedure for changing the setting values

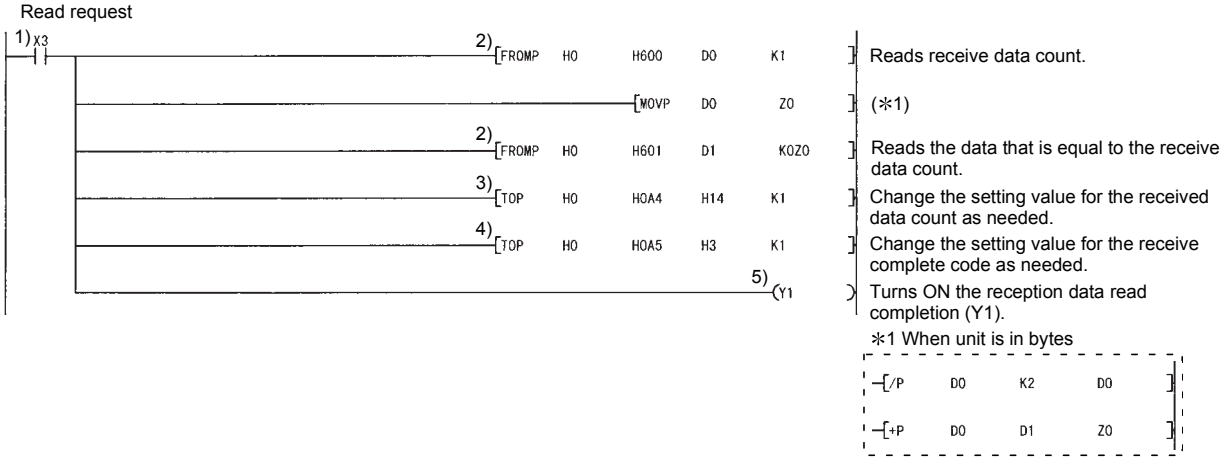
1) Timing of change
   To change the receive complete code and received data count after data communication has started, change the setting when the status of the I/O signals relating to the reading of receive data is as follows.
   - Reception data read request (X3/XA) or reception abnormal detection (X4/XB): ON
   - Reception data read completion (X1/Y8): OFF

2) Change procedure
   When data reception from an external device causes the reception data read request (X3/XA)/reception abnormal detection (X4/XB) to turn ON, turn ON the reception data read completion (Y1/Y8) after performing the following.
   - Read the receive data.
   - Change the setting values for the receive complete code and the received data count.

(Example) When reading data received in the CH1 side interface



(Program example: I/O signals for the Q series C24 are from X/Y00 to X/Y1F)

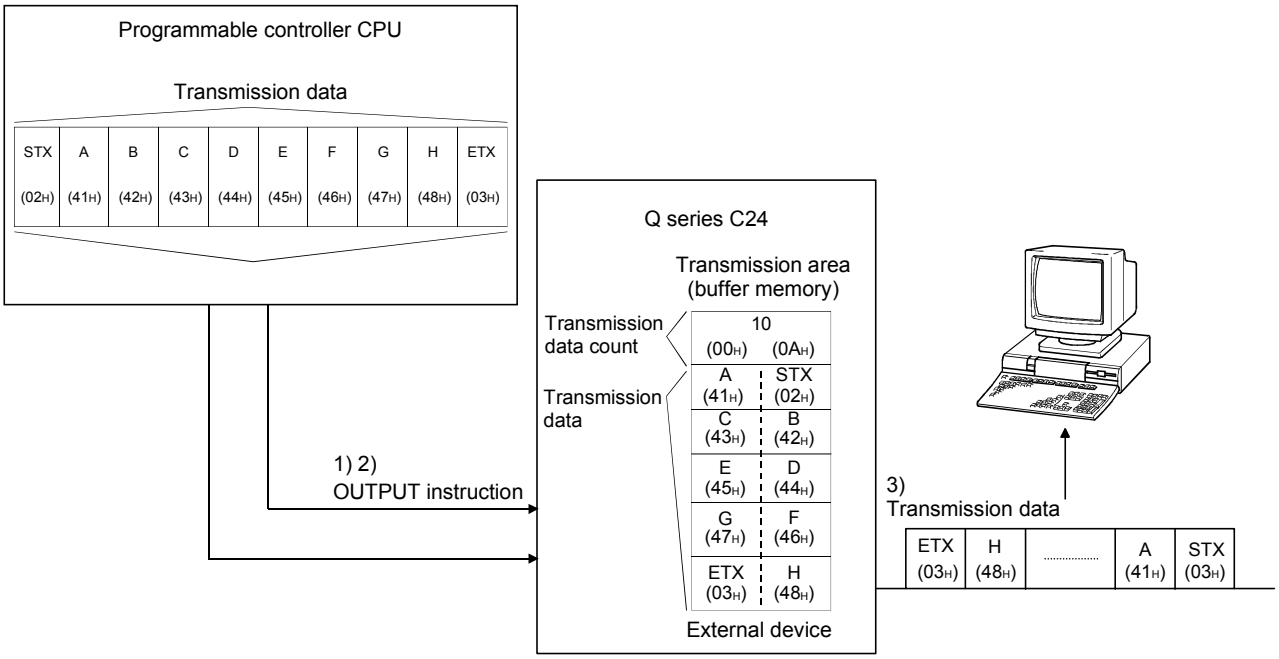

Read request
1) X3
2) FROMP H0 H600 D0 K1
Reads receive data count.
MOVP D0 Z0
(*1)
2) FROMP H0 H601 D1 K0Z0
Reads the data that is equal to the receive data count.
3) TOP H0 H0A4 H14 K1
Change the setting value for the received data count as needed.
4) TOP H0 H0A5 H3 K1
Change the setting value for the receive complete code as needed.
5) Y1
Turns ON the reception data read completion (Y1).
*1 When unit is in bytes
/P D0 K2 D0
+P D0 D1 Z0

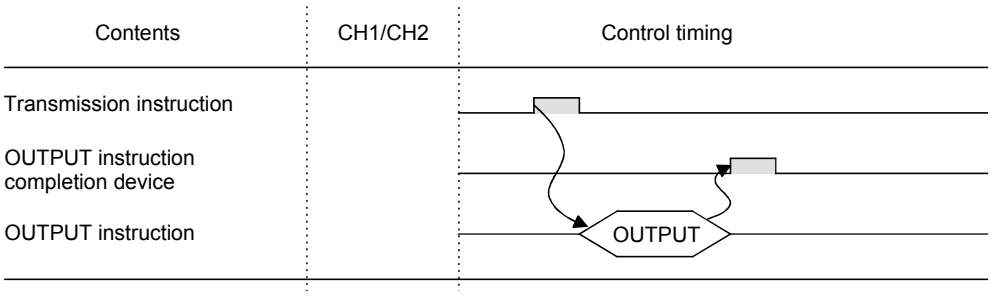
6.2 Sending Data to the External Device

This section explains data transmission from the programmable controller CPU to the external device.

6.2.1 Transmission methods

The following shows how to send data in any format using the non procedure protocol.





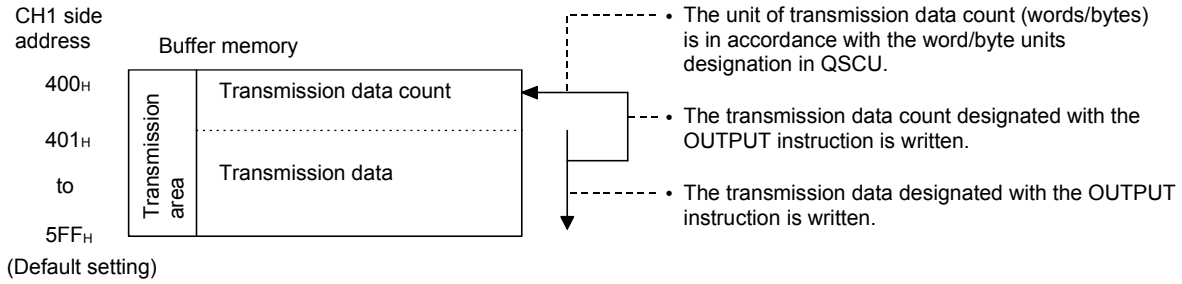
1) Transmission data is stored in the device designated with the OUTPUT instruction.
2) Control data is stored in the device designated with the OUTPUT instruction.
3) When the OUTPUT instruction is executed, the Q series C24 sends the amount of data designated by the transmission data count from the transmission data area to the external device in ascending order of the transmission data area addresses.

6.2.2 Arrangement and contents of the transmission area and the transmission data

This section explains the arrangement and contents of the transmission area and the transmission data for performing data transmission using the non procedure protocol.

(1) Transmission area

The transmission area is a memory area for storing the data and the data count that are transmitted from the programmable controller CPU to the external device via the Q series C24. By default, the transmission area is assigned to addresses 400H to 5FFH (CH1 side) and 800H to 9FFH (CH2 side).


CH1 side address
Buffer memory
400H
401H
to
5FFH
(Default setting)
Transmission area
Transmission data count
Transmission data
• The unit of transmission data count (words/bytes) is in accordance with the word/byte units designation in QSCU.
• The transmission data count designated with the OUTPUT instruction is written.
• The transmission data designated with the OUTPUT instruction is written.

POINT

(1) The position and size of the transmission area in the buffer memory can be changed with GX Configurator-SC in accordance with the specifications of the external device and the received data length. (See Sections 9.4.5 and 9.4.7.)

(a) When changing the position and size of the transmission area in the buffer memory with GX Configurator-SC, specify as follows:

1) Transmission buffer memory head address designation
Designate the starting address for the area to be used as the transmission area in the user definable area (address: 400_H to $1AFF_H$, 2600_H to $3FFF_H$).

2) Transmission buffer memory length designation
Designate by addresses the length of the area (0001_H to $1A00_H$) to be used as the transmission area in the user definable area (address: 400_H to $1AFF_H$, 2600_H to $3FFF_H$).

(b) When changing the position and size of the receive area in the buffer memory, if any of the functions below are used concurrently, make sure that the addresses of the transmission area do not overlap with the buffer memory addresses assigned for storing transmission/receive data with the functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Pre-defined protocol function (transmission/reception data storage area)
6) Communication data monitoring function

(2) Set the size of data per data transmission from the programmable controller CPU to the external device so that it is smaller than the size of the transmission data's designated area in the buffer memory.

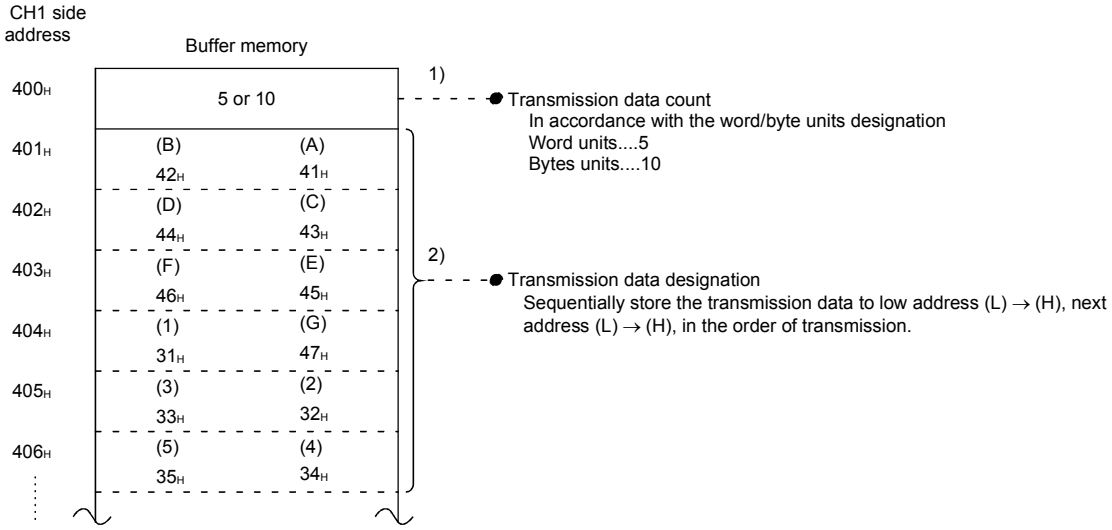
(Transmission data designation area) $\geqq$ (Size of arbitrary data portion to be sent from the programmable controller CPU)

To transmit data whose size is larger than the transmission data designation area, increase the transmission area, or divide the transmission data before sending.

(2) Transmission data arrangement

The following example shows an arrangement of the transmission data to be sent to the external device when storing it in the transmission area.

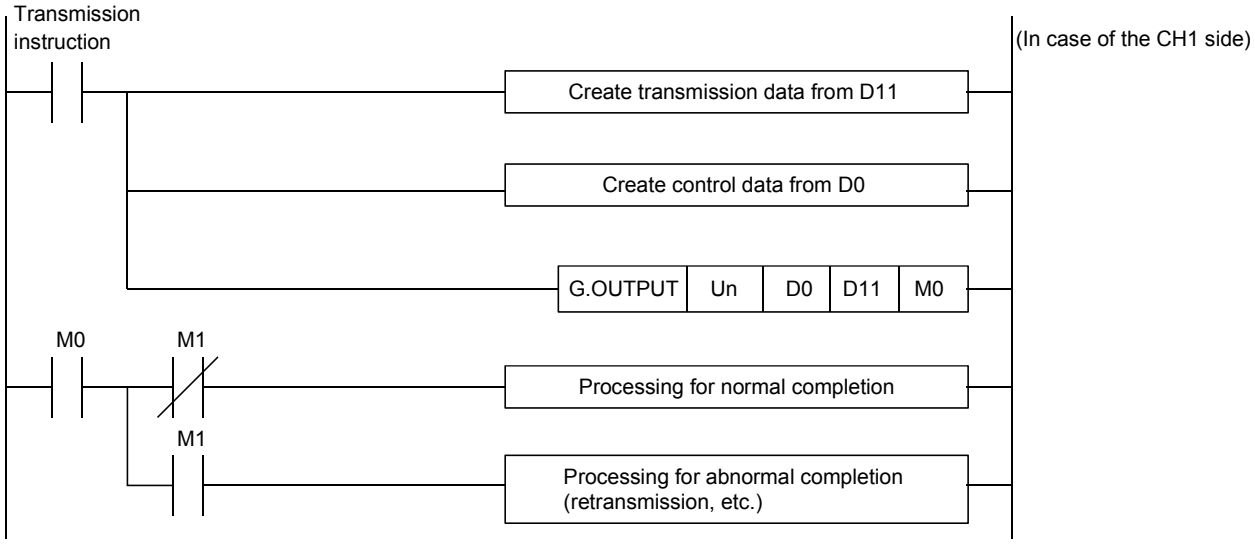
(Example) When transmitting "ABCDEFG123" (The transmit area is the default value.)

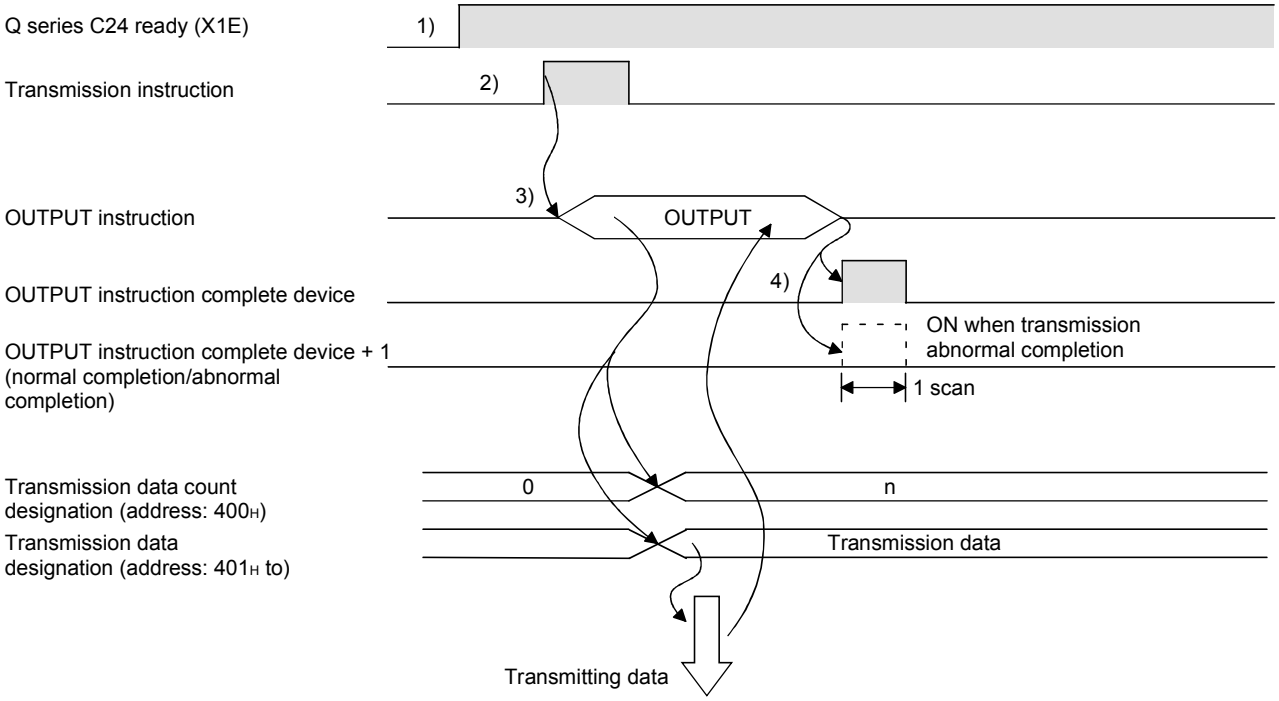


6.2.3 Sequence program for transmission data

A sequence program for transmission data is explained below.

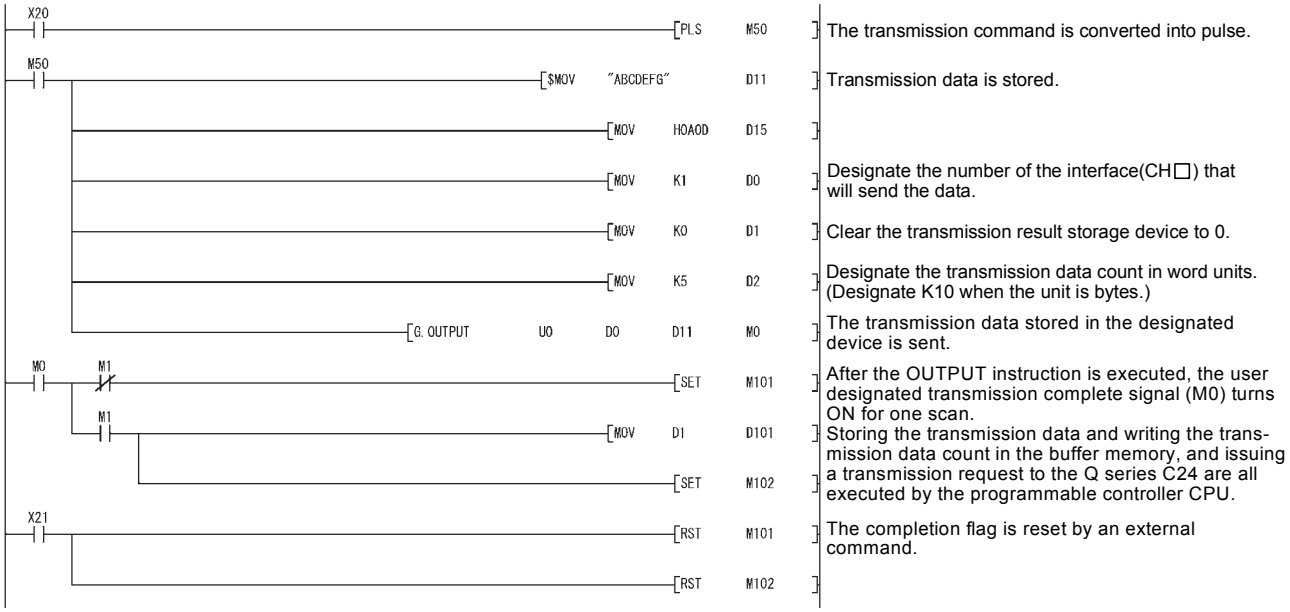
For details on the OUTPUT instruction used for data transmission, see Chapter 10.

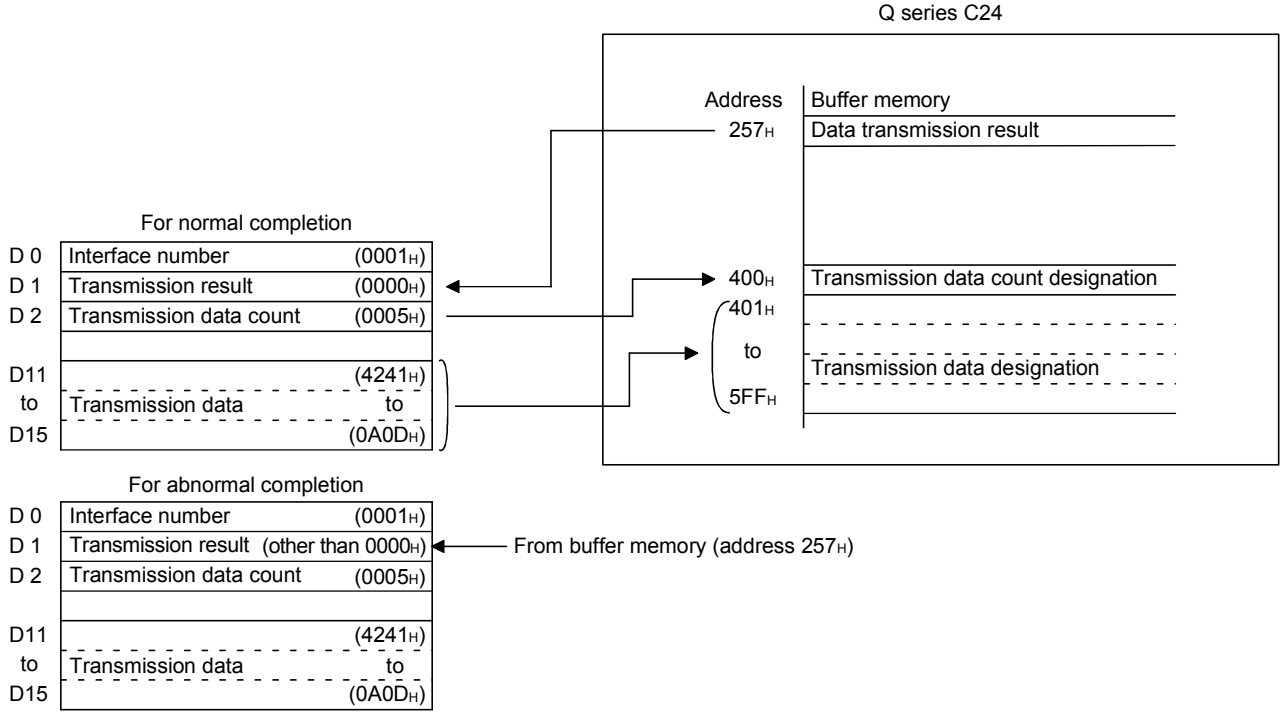




1) Starts the local station programmable controller CPU.
   The setting values for GX Developer are stored in the Q series C24.
2) Inputs the user data transmission command signal.
3) Executes the OUTPUT instruction after storing the transmission data and the control data for the OUTPUT instruction in the device.
   Data is sent when the OUTPUT instruction is executed.
4) When the Q series C24 transmission processing completes, the completion device for the OUTPUT instruction turns ON.
   When the completion device + 1 (abnormal completion signal) turns ON, the error code is stored in the control data completion status (S1+1).

(Program example)
When Q series C24 I/O signals are from X/Y00 to X/Y1F:


X20
PLS M50
The transmission command is converted into pulse.
M50
$MOV "ABCDEFG" D11
Transmission data is stored.
MOV H0A0D D15
MOV K1 D0
Designate the number of the interface(CH□) that will send the data.
MOV K0 D1
Clear the transmission result storage device to 0.
MOV K5 D2
Designate the transmission data count in word units. (Designate K10 when the unit is bytes.)
G. OUTPUT U0 D0 D11 M0
The transmission data stored in the designated device is sent.
M0 M1
SET M101
After the OUTPUT instruction is executed, the user designated transmission complete signal (M0) turns ON for one scan.
M1
MOV D1 D101
Storing the transmission data and writing the transmission data count in the buffer memory, and issuing a transmission request to the Q series C24 are all executed by the programmable controller CPU.
SET M102
X21
RST M101
The completion flag is reset by an external command.
RST M102



POINT

(1) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 10.)

(2) More than one OUTPUT instruction cannot be executed simultaneously. Execute the next OUTPUT instruction only after the execution of the first OUTPUT instruction is completed.

6.2.4 How to detect transmission errors

This section explains how to detect errors that may occur when sending data to the external device.

The following items are considered as the primary causes of errors that may occur during data transmission.

Cause of reception error	Reference section
A timeout occurred for the transmission monitoring time (timer 2).	User's Manual (Application)
Designated number of transmission data was larger than the size that could be stored in the transmission area.	Section 6.2.2

(1) Confirmation using the sequence program

(a) Detecting a transmission error

1) The following device and input signal turn ON.
   - OUTPUT instruction complete device + 1
   - ERR. occurrence (XE/XF)
2) The transmission error code can be checked using the OUTPUT instruction control data ((S1) + 1).
   Or, it can be checked by reading the data transmission result (address: 257H/267H).
   For details on how to check the error code contents and corrective actions, see Chapter 11.

(b) How to turn off the ERR LED and clear the error code (see Section 11.1.2)

1) To turn off only the ERR LED, write "1" to the LED off, Communication error clear request (address: 0H/1H).
2) To turn off the ERR LED and clear the error code, turn ON the ERR. clear request (YE/YF).

(Example) To perform the ERR LED OFF and the error code clear on the CH1 side



(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a transmission error, the ERR LED lights up. (See Chapter 11.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 9.6.3 and 9.6.5.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 9.6.11.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 9.6.5.)
   - GX Developer buffer memory monitor function (monitors addresses 257H/267H)

POINT
When a transmission error occurs, the programmable controller CPU may not transmit all the designated data. It is recommended that data communications be performed by establishing a user arbitrary communication procedure that can check normal transmission by reception of a response to data transmission.

6.3 Data Communications Precautions

The following describes the precautions to be taken during non procedure protocol data communications.

(1) The Q series C24 transmission sequence initialization conditions

The initial status indicates the status where transmission has stopped and reception data has been discarded.
The Q series C24 transmission sequence initialization conditions are as follows.

1) When the power is turned on, the Reset switch on the CPU module is operated, or the Q series C24 mode is switched
2) When the receive data was cleared.
3) When the CD(DCD) signal was turned off when data communications were performed by setting CD terminal check enable during full-duplex communications through the RS-232 interface.

(2) Generation of framing error in external device

When nothing is transmitted from the Q series C24 to the external device through the RS-422/485 interface, a framing error may be generated by the noise etc, in the external device.
Send an arbitrary code to identify the head of the send data from the Q series C24 to the external device.
Before data communication check the Q series C24 interface specifications.

(3) Data communications with external device (computer, etc.) over a multidrop link

When the external device programmable controller CPU are connected by a 1:n multidrop link, each the Q series C24 receives the data transmitted by the external device.
With a multidrop link, receive data by user frame (*1).
If data is not received by user frame, a sequence program that ignores the receive data other than the receive data addressed to the local station by sequence program, including the data indicating the objective programmable controller CPU in the message, must be written.
(Sample message)

(Example)

STX	Space	Station No. 0	Station No. 2	Data length (BIN data)	Data	CR	LF
(02_H)	(20_H)	(32_H)	(32_H)			($0D_H$)	($0A_H$)

*1 See the User's Manual (Application).

(4) Retry processing for data reception errors

The data when reception error occurred is discarded and only the data for the normal reception is taken into the Q series C24. For this reason, the reception message may be missing data when an error occurs. To assure the correct transmission and reception of data it is recommended that a normal/error response message is received and a response message reception timeout check is conducted for data transmitted between the programmable controller CPU and the external equipment and that measures be taken when an error message is received or when an error timeout occurs, such as retransmitting the data (transmission retry).

7 DATA COMMUNICATION USING THE BIDIRECTIONAL PROTOCOL

Data communication using the bidirectional protocol is a function for sending/receiving any data using the message format and transmission control procedure for the Q series C24 bidirectional protocol between external devices and programmable controller CPUs.
Any external devices that can install application programs and transmit and receive data in accordance with the MELSEC programmable controller protocol can communicate with the programmable controller CPUs using the bidirectional protocol.

This chapter explains the basic transmission and reception methods when performing data communication using the bidirectional protocol.
Follow the procedure described in this chapter to create sequence programs for sending and receiving data for the programmable controller CPU.
Regarding the additional functions listed below for data communication using the bidirectional protocol, see the separate User's Manuals (Application).

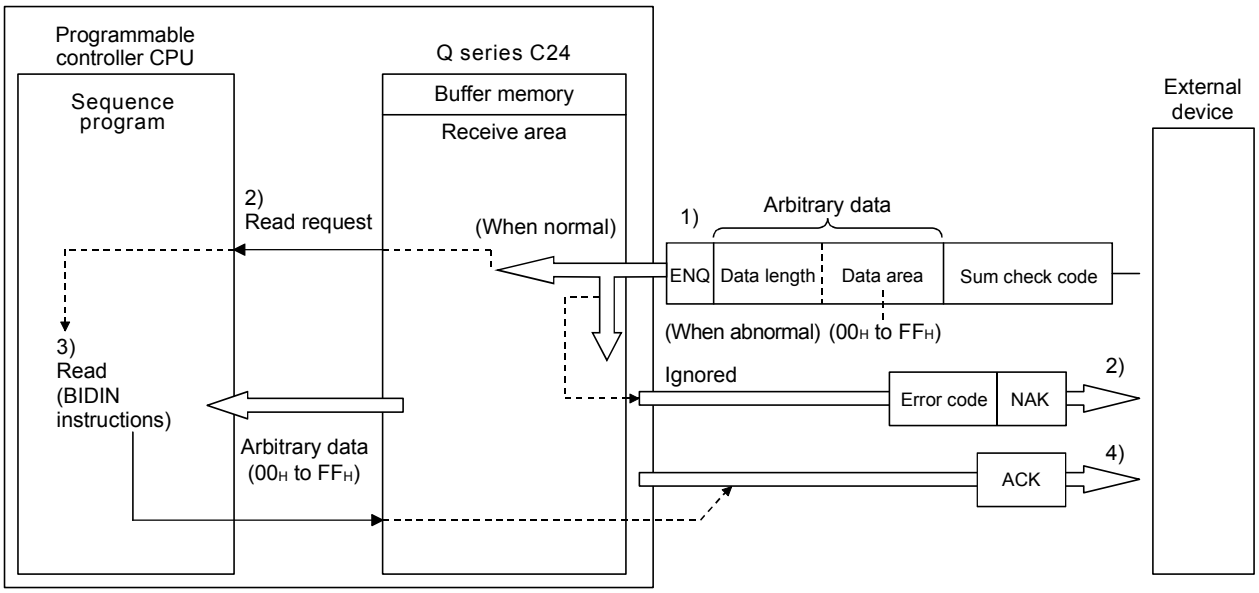
- Reading receive data using interrupt programs
- Sending/receiving data using ASCII data (ASCII-BIN conversion)
- Sending/receiving data using transparent code designation

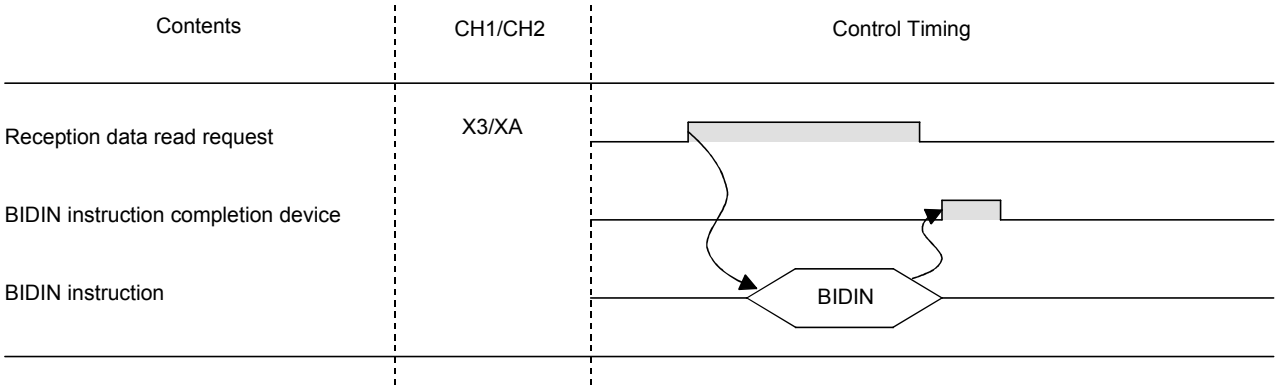
7.1 Data Reception from the External Device

This section explains the data reception from the external device.

7.1.1 Receiving methods

The following shows how to receive data sent from the external device using the bidirectional protocol. Since the size of each message received is recognized using the "data length" information contained in the message, messages of any size can be sent from the external device.





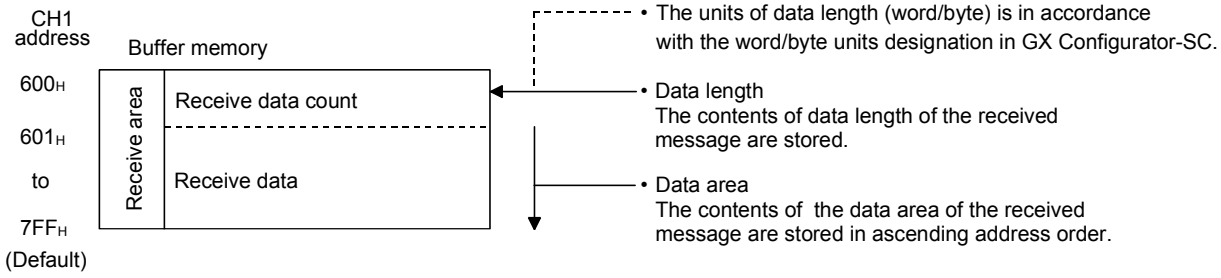
1) When the control code ENQ is received, the Q series C24 starts data reception processing.
   When the data specified by the data length is received, the Q series C24 ends the reception processing of that data.
   If "Sum check" is set with GX Developer, the Q series C24 checks whether the message is normal or abnormal using the sum check code received immediately after the message and the sum check code calculated by internal processing.
   ✻ If "No sum check" is set with GX Developer, messages are not checked using the sum check codes.
2) If the message has normally been received, the reception data read request (X3/XA) turns ON.
   ✻ If an error has been detected when receiving the message, the Q series C24 sends an abnormal end response (NAK message) to the external device.
   The reception data read request will not be sent to the programmable controller CPU.
   (The reception abnormal detection (X4/XB) does not come on.)
3) Control data is stored in the device designated with the BIDIN instruction and then the BIDIN instruction is executed.
   Receive data is read from the receive area of the buffer memory.
4) When the BIDIN instruction has been executed, the Q series C24 sends a normal end response (ACK message) to the external device.

7.1.2 Arrangement and contents of the receive area and the receive data

This section shows the arrangement and contents of the receive area and the receive data for performing data reception using the bidirectional protocol.

(1) Receive area

The receive area is a memory that stores the received data length (receive data count) and data area received from an external device.
The receive area is allocated to addresses 600_H to $7FF_H$ (CH1 side) and $A00_H$ to BFF_H (CH2 side) at initial setting.


CH1 address
Buffer memory
600H
601H
to
7FFH
(Default)
Receive area
Receive data count
Receive data
• The units of data length (word/byte) is in accordance with the word/byte units designation in GX Configurator-SC.
• Data length
The contents of data length of the received message are stored.
• Data area
The contents of the data area of the received message are stored in ascending address order.

POINT

(1) The position and size of the receive area in the buffer memory can be changed with GX Configurator-SC in accordance with the specifications of the external device and the received data length. (See Sections 9.4.5 and 9.4. 8.)

(a) When changing the position and size of the receive area in the buffer memory with GX Configurator-SC, specify as follows:

1) Receive buffer memory head address designation
Designate the starting address for the area to be used as the receive area in the user definable area (address: 400H to 1AFFH, 2600H to 3FFFH).

2) Receive buffer memory length designation
Designate by addresses the length of the area (0001H to 1A00H) to be used as the receive area in the user definable area (address: 400H to 1AFFH, 2600H to 3FFFH).

(b) When changing the position and size of the receive area in the buffer memory, if any of the functions below are used concurrently, make sure that the addresses of the receive area do not overlap with the buffer memory addresses assigned for storing transmission/receive data with the functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Pre-defined protocol function (Transmission/reception data storage area)
6) Communication data monitoring function

(2) When sending data to the Q series C24 from the external device, one of the following two adjustments should be made so that the relationship shown below is maintained.

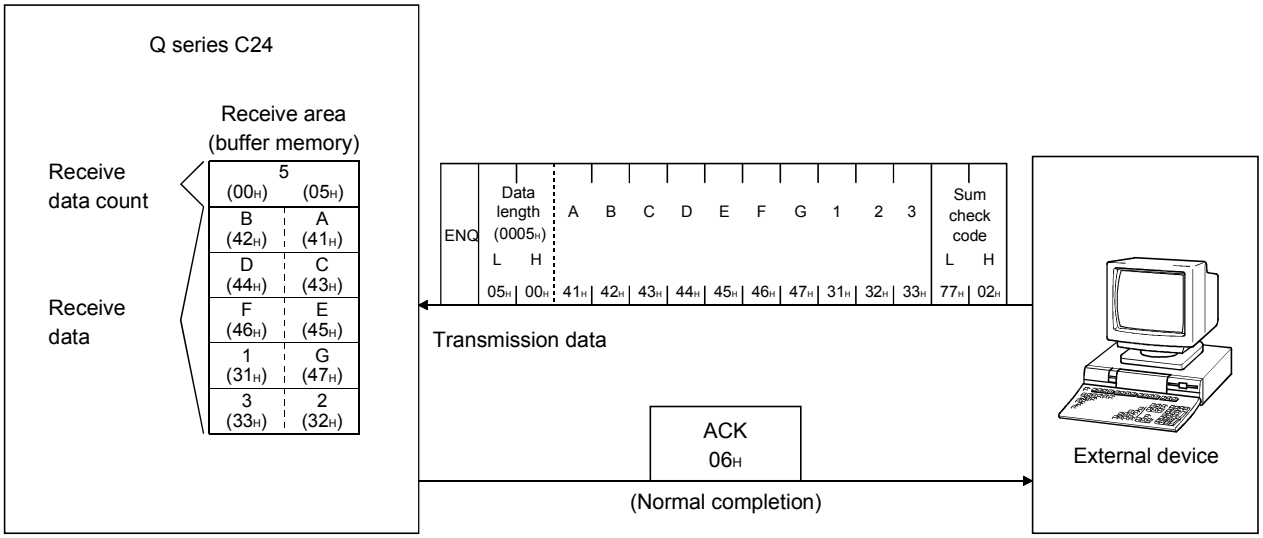
1) Reduce the send data size.
2) Increase the receive area.

(Receive data storage area) ≧ (Size of data portion sent from the external device)

(2) Arrangement of receive data

The following example illustrates the arrangement of data received from the external device when it is stored in the receive area.

1) The receive message is stored to the Q series C24 buffer memory (receive data storage area).
2) The data is stored to the receive data storage area in low address (L) → (H), next address (L) → (H) order.
   If the received data is "ABCDEFG123", it will be stored as shown below (for the CH1 side):



∗ When the data length unit is in bytes, 00H is stored in the higher byte of the last data storage position in the receive area when the data length of the message is an even byte.

(3) Contents of receive data

∗ The contents of receive data, including the receive data as indicated in Section 7.2.2, are explained below.

(a) Control codes

The types of control codes are listed in the table below.

Signal name	Code (hexadecimal)	Contents	Application
ENQ	05H	Enquiry	Code for starting data transmission.
ACK	06H	Acknowledge	Response code to the opposite side when data was received normally.
NAK	15H	Negative Acknowledge	Response code to the opposite side when data could not be received normally. (Error code is sent immediately after the response code.)

1) For data communication from the external device to the Q series C24 the Q series C24 checks and processes the control code received. It cannot be read from the sequence program.
2) For data communication from the Q series C24 to the external device The control code to be transmitted is added by the Q series C24.

(b) Data length

This indicates the number of bytes or words for the data portion of the message.

The unit of data length (words/bytes) is in accordance with the word/byte units designation in GX Configurator-SC.

1) For data communication from the external device to the Q series C24
The Q series C24 checks the length of the data received.
When the reception is normal, the Q series C24 stores the receive data in the receive data storage area of the Q series C24 buffer memory, assigning the first byte as the lower byte (L).
2) For data communication from the Q series C24 to the external device
The length of the transmission data is the number of the transmission data designated by the sequence program using the BIDOUT instruction.
The Q series C24 sends this value as is from the lower byte (L).

(c) Data portion

This consists of an array of original one-byte data to be transmitted to the external device side, which can handle 00_H to FF_H code data.

1) For data communication from the external device to the Q series C24
If the receive data portion is normal, the Q series C24 takes the codes as is and stores them in the receive data storage area in sequence, beginning with the youngest address.
The storage size is in accordance with the data length in the message (See item (b) above) and the word/byte units designation in GX Configurator-SC.
2) For data communication from the Q series C24 to the external device
The transmission data portion is the number of the transmission data designated by the sequence program using the BIDOUT instruction.
The Q series C24 sends the transmission data using the existing codes until the transmission data count is reached in accordance with the word/byte units designation in GX Configurator-SC to the transmission data designation area.

(d) Sum check code

The sum check code expresses the numeric value for the lower two bytes (16 bits) of the results (sum) from the addition of the data length and the data portion in the message as binary code data.

When "Sum check" is specified with the transmission setting in GX Developer, it is necessary to add a sum check code at the end of the message.

1) For data communication from the external device to the Q series C24

The Q series C24 checks and processes the sum check code received. It cannot be read from the sequence program.

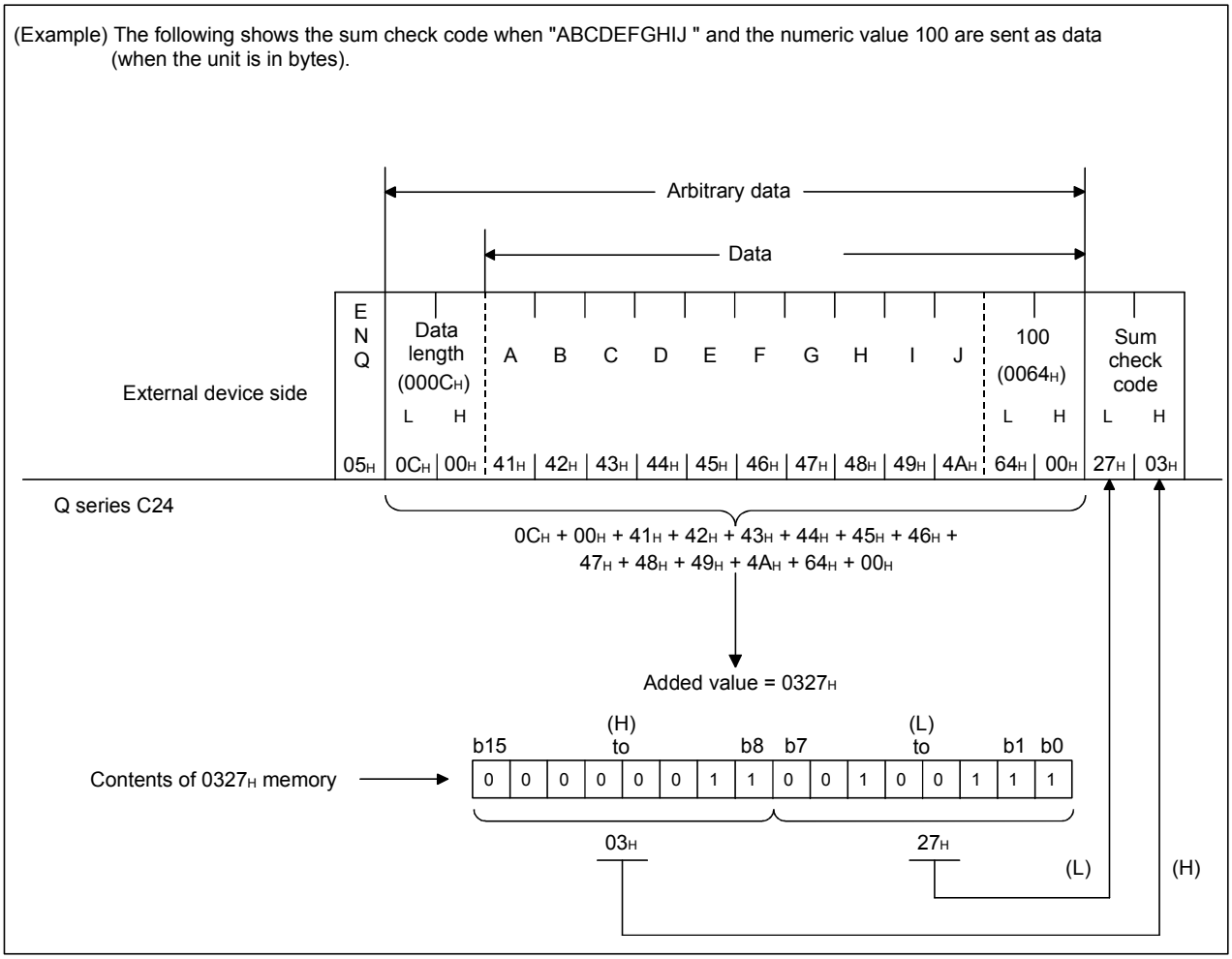
When "No sum check" is specified, once a data portion of message corresponding to the data length is received, the succeeding data received will be ignored up to the control code that follows (See (a)).

The following example shows the contents of a sum check code in the message.

2) For data communication from the Q series C24 to the external device

The sum check code to be transmitted is calculated and added by the Q series C24. When "No sum check" is specified, no sum check code is transmitted.

(Example) The following shows the sum check code when "ABCDEFGHIJ " and the numeric value 100 are sent as data (when the unit is in bytes).


Arbitrary data
Data
External device side
ENQ
Data length (000CH)
L H
A B C D E F G H I J
100 (0064H)
L H
Sum check code
L H
05H 0CH 00H 41H 42H 43H 44H 45H 46H 47H 48H 49H 4AH 64H 00H 27H 03H
Q series C24
0CH + 00H + 41H + 42H + 43H + 44H + 45H + 46H + 47H + 48H + 49H + 4AH + 64H + 00H
Added value = 0327H
(H) to b15
(L) to b1 b0
b8 b7
Contents of 0327H memory
0 0 0 0 0 0 1 1 0 0 1 0 0 1 1 1
03H
27H
(L)
(H)

(e) Error code

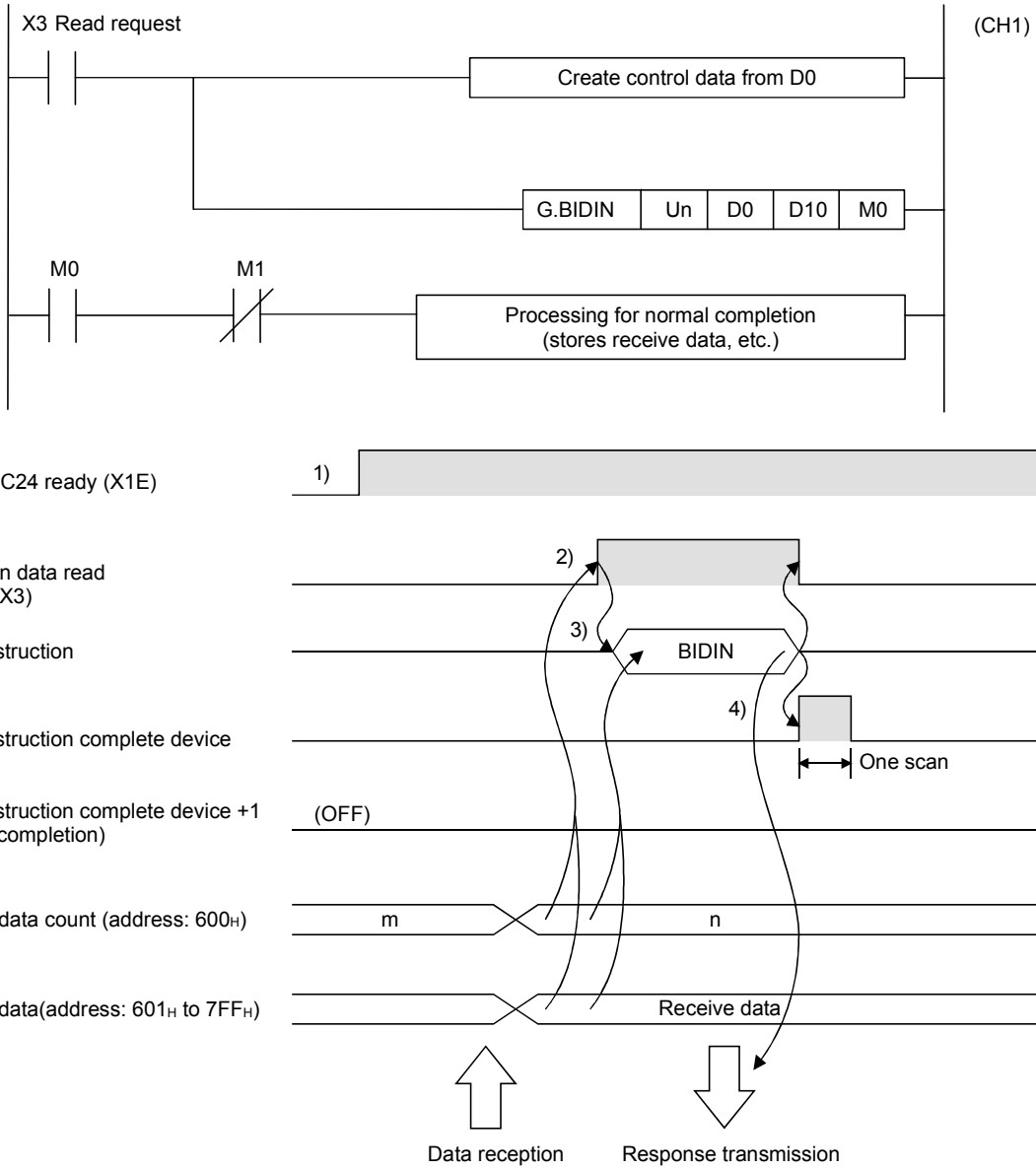
The error code indicates the definition of the error during NAK response. (For more details on the error codes, see Chapter 11.)

1) For data communication from the external device to the Q series C24
For error codes from the external device, transmit the codes specified by the user.
The error codes (0022_H to $005F_H$) that are not used by the Q series C24 can be used.
The Q series C24 stores the received error codes as a completion status in the control code for the BIDOUT instruction.
They are also stored in the data transmission result (address: 257_H).

2) For data communication from the Q series C24 to the external device
The error codes are added by the Q series C24.
When an error code is transmitted, the Q series C24 writes the same error code in the data reception result (address: 258_H).

7.1.3 Sequence program for data reception

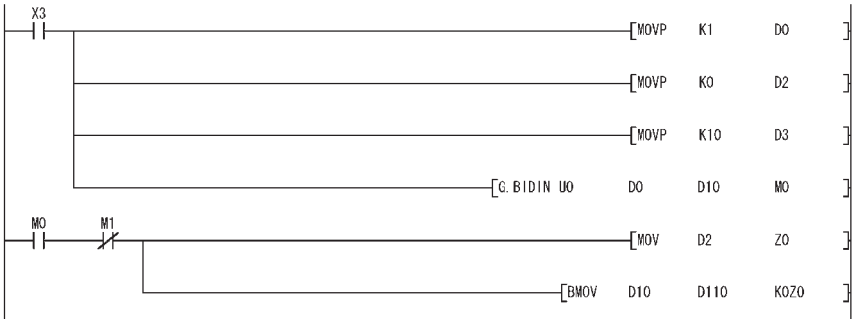
This section explains the sequence program for data reception.
For details on the BIDIN instruction for data reception, see Chapter 10.



1) Start the local station programmable controller.
   The values specified with GX Developer are stored in the Q series C24.
2) When data is received from the external device, the reception data read request (X3) turns ON.
3) After the control data for the BIDIN instruction is stored in the device, the sequence program executes the BIDIN instruction and reads the receive data.
4) When the reading of receive data is completed, a response message (ACK message when the operation was completed normally) is sent and the device that has completed the BIDIN instruction turns ON.

(Program example)

When Q series C24 I/O signals are from X/Y00 to X/Y1F:



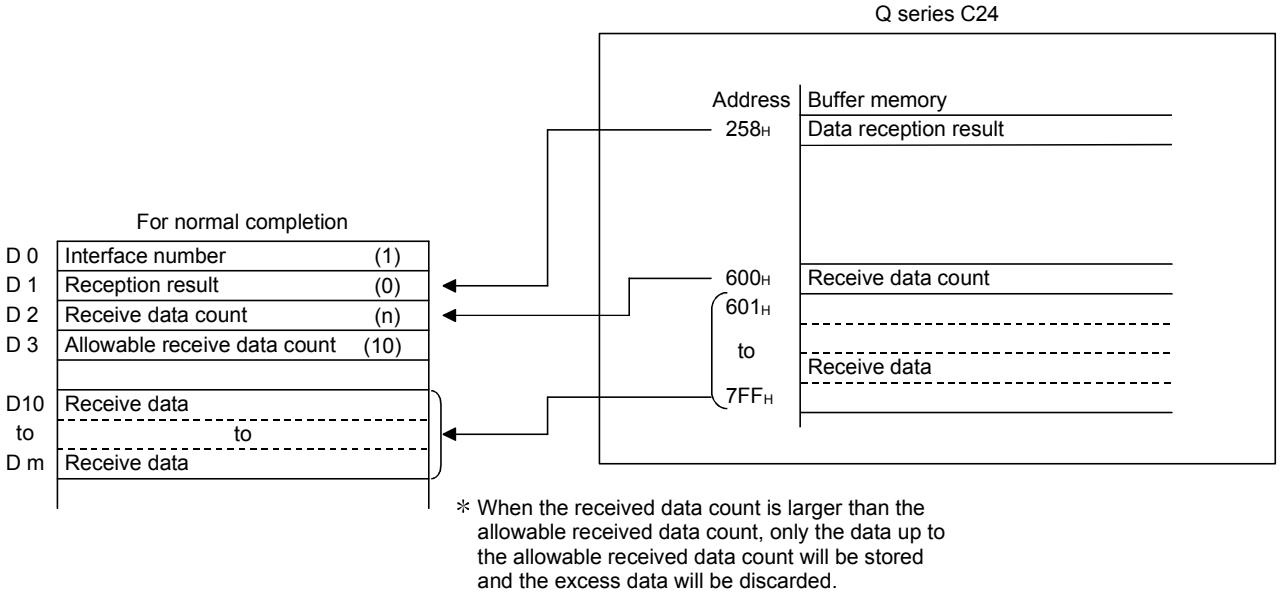
Designate the receive channel.

Clear the receive data count storage device to 0.

Designate the allowable receive data count.

With the normal completion, the receive data within the allowable receive data count (user designated) is read from the receive data storage area in the buffer memory.

- After the BIDIN instruction is executed, the user designated read completion signal (M0) comes on for 1 scan.
- The reading of received data is performed by the programmable controller CPU.



* When the received data count is larger than the allowable received data count, only the data up to the allowable received data count will be stored and the excess data will be discarded.

POINT

(1) Receive data can also be read using interrupt programs.
For more details on reading receive data with interrupt programs, see the User's Manual (Application).
Note that if the reading of data received from the same interface is to be performed, it is not possible to combine the reading of data received by the main program and reading of data received by the interrupt program.
Accordingly, use one or the other of the above programs to read the data received.

(2) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 10.)

(3) More than one BIDIN instruction cannot be executed simultaneously.
Execute the next BIDIN instruction only after the execution of the first BIDIN instruction is completed.

(4) If the communication data count is set in byte units and the receive data count is an odd byte when requesting the reading of receive data to the programmable controller CPU, 00_H is stored in the higher byte of the final data storage position in the receive data storage area.

7.1.4 How to detect reception errors

This section explains how to detect errors that may occur when receiving data from the external device.

The following items are considered as the primary causes of errors that may occur during data reception.

Cause of reception error	Reference section
A transmission error occurred because of noise.	—
A timeout occurred for the no-reception monitoring time (timer 0).	User's Manual (Application)
A timeout occurred for the transmission monitoring time (timer 2).	
Data that could not be converted with the ASCII-BIN conversion was detected.	
Received the data length that was too long to store in the receiving area.	Section 7.1.2
Simultaneous transmissions occurred.	Section 7.3

(1) Confirmation using the sequence program

(a) Detecting the occurrence of a reception error

1) ERR. occurrence is on.
2) The receive error code is confirmed and read in data reception result (address: 258H/268H).
   For details on how to check the error code contents and corrective actions, see Chapter 11.

(b) How to turn off the ERR LED and clear the error code (see Section 11.1.2)

1) To turn off only the ERR LED, write a "1" to the Communication error clear request and to turn LED off (address: 0H/1H).
2) To turn off the ERR LED and clear the error code, turn ON the ERR. clear request (YE/YF).
   (Example) To perform the ERR LED OFF and the error code clear on the CH1 side



(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a transmission error, the ERR LED lights up. (See Chapter 11.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 9.6.3 and 9.6.6.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 9.6.11.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 9.6.6.)
   - GX Developer buffer memory monitor function (monitors addresses 258H/268H)

(3) Handling of receive data when a reception error occurs

1) All of the receive data for which an error was detected is ignored and a response message indicating an abnormal completion (NAK message) is sent to the external device.
   ＊ When an error is detected during message reception, the Q series C24 does not issue a reception data read request to the programmable controller CPU.
2) The receive area in the buffer memory will contain the data received normally just prior to the error occurrence. (Data will not be rewritten.)

7.1.5 Receive data clear

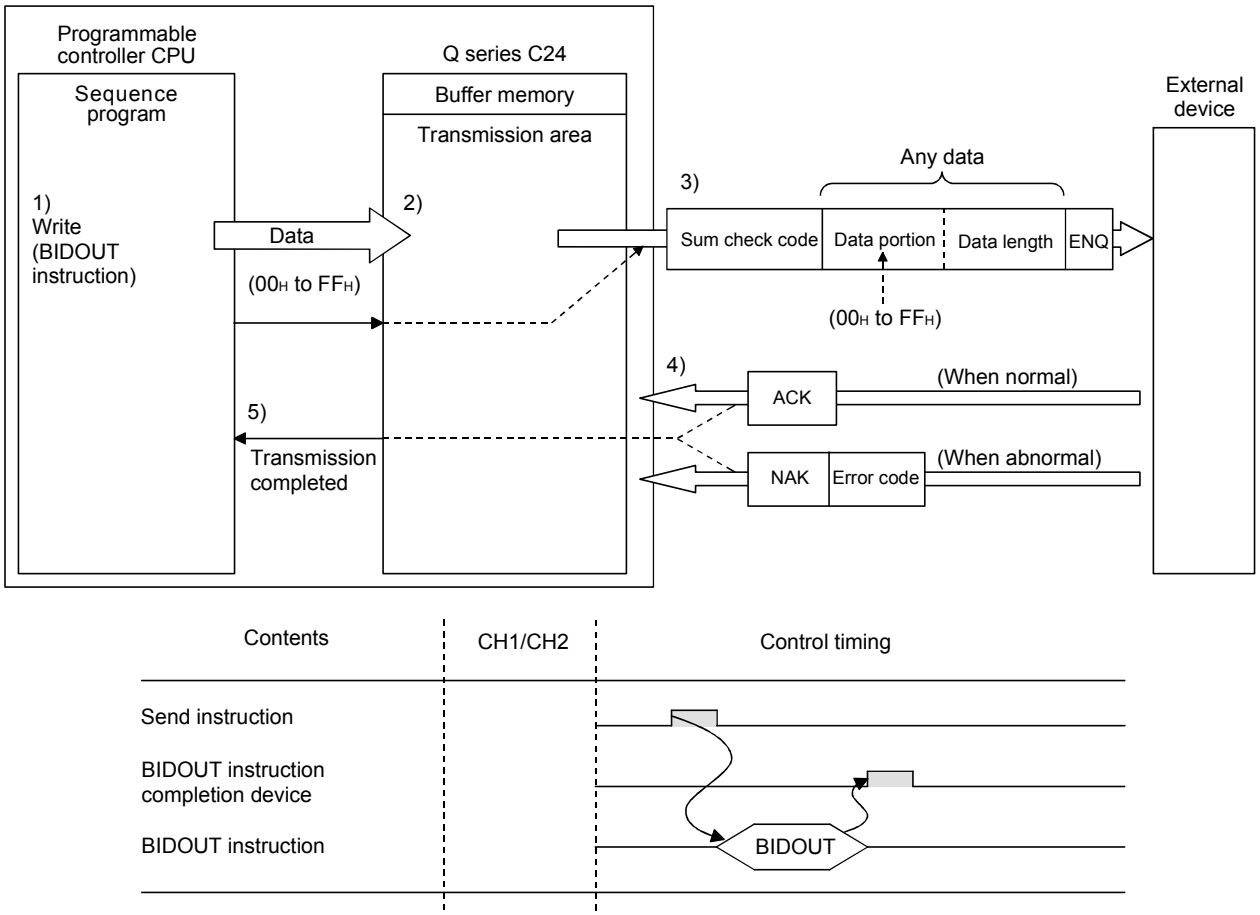
Data communications using the bidirectional protocol must be performed after a response message is received in reply to the preceding data transmission.
If the Q series C24 detects an error while receiving data, it sends an NAK message (response message) to the external device after the data reception completion and ignores the data being received when the error was detected.
Therefore, the receive data does not have to be cleared.

7.2 Sending Data to the External Device

This section explains data transmission from the programmable controller CPU to the external device.

7.2.1 Transmission methods

The following shows the method of sending data to the external device through data communication using the bidirectional protocol.



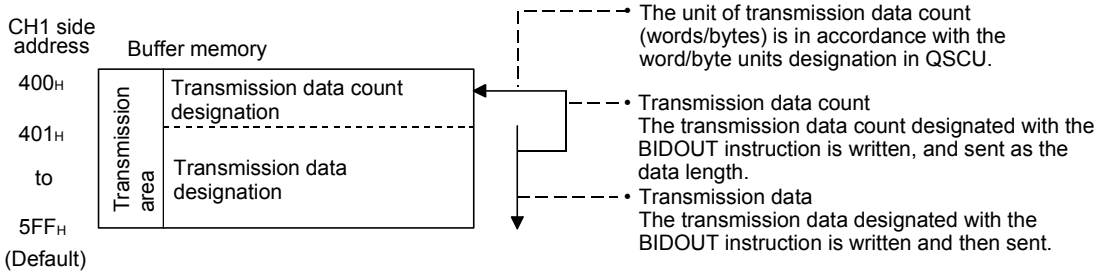
1) Data such as control data and transmission data are stored in the device designated with the BIDOUT instruction and then the BIDOUT instruction is executed.
2) The transmission data count and transmission data are written into the transmission area of the buffer memory.
3) The Q series C24 sends data by adding the control code ENQ at the beginning of the data.
   * When "Sum check" is designated with GX Developer, the Q series C24 adds the sum check code calculated by internal processing to the end of the message and then transmits the message.
   When "No sum check" is designated with GX Developer, no sum check code is sent.
4) A response for the data transmission (for normal completion: ACK message; for abnormal completion: NAK message) is received.
5) The execution of the BIDOUT instruction completes with the transmission processing completion of the Q series C24.

7.2.2 Arrangement and contents of the transmission area and the transmission data

This section explains the arrangement and contents of the transmission area and the transmission data for performing data transmission using the bidirectional protocol. For details on the contents of transmission data, see Section 7.1.2 (3).

(1) Transmission area

The transmission area is a memory area for storing the data and the data count that are transmitted from the programmable controller CPU to the external device via the Q series C24. By default, the transmission area is assigned to addresses 400H to 5FFH (CH1 side) and 800H to 9FFH (CH2 side).


CH1 side address
Buffer memory
400H
401H
to
5FFH
(Default)
Transmission area
Transmission data count designation
Transmission data designation
The unit of transmission data count (words/bytes) is in accordance with the word/byte units designation in QSCU.
Transmission data count
The transmission data count designated with the BIDOUT instruction is written, and sent as the data length.
Transmission data
The transmission data designated with the BIDOUT instruction is written and then sent.

POINT

(1) The position and size of the transmission area in the buffer memory can be changed with GX Configurator-SC in accordance with the specifications of the external device and the transmission data length. (See Section 9.4.5.)

(a) When changing the position and size of the transmission area in the buffer memory with GX Configurator-SC, designate as follows:

1) Transmission buffer memory head address designation
Designate the starting address for the area to be used as the transmission area in the user definable area (address: 400H to 1AFFH, 2600H to 3FFFH).

2) Transmission buffer memory length designation
Designate by addresses the length of the area (0001H to 1A00H) to be used as the transmission area in the user definable area (address: 400H to 1AFFH, 2600H to 3FFFH).

(b) When changing the position and size of the receive area in the buffer memory, if any of the functions below are used concurrently, make sure that the addresses of the transmission area do not overlap with the buffer memory addresses assigned for storing transmission/receive data with the functions.

1) MC protocol buffer memory read/write function
2) MC protocol on-demand function
3) Non procedure protocol transmission/receive function
4) Bidirectional protocol transmission/receive function
5) Pre-defined protocol function (transmission/reception data storage area)
6) Communication data monitoring function

(2) Set the size of data per data transmission from the programmable controller CPU to the external device to be smaller than the size of the transmission data designation area in the buffer memory.

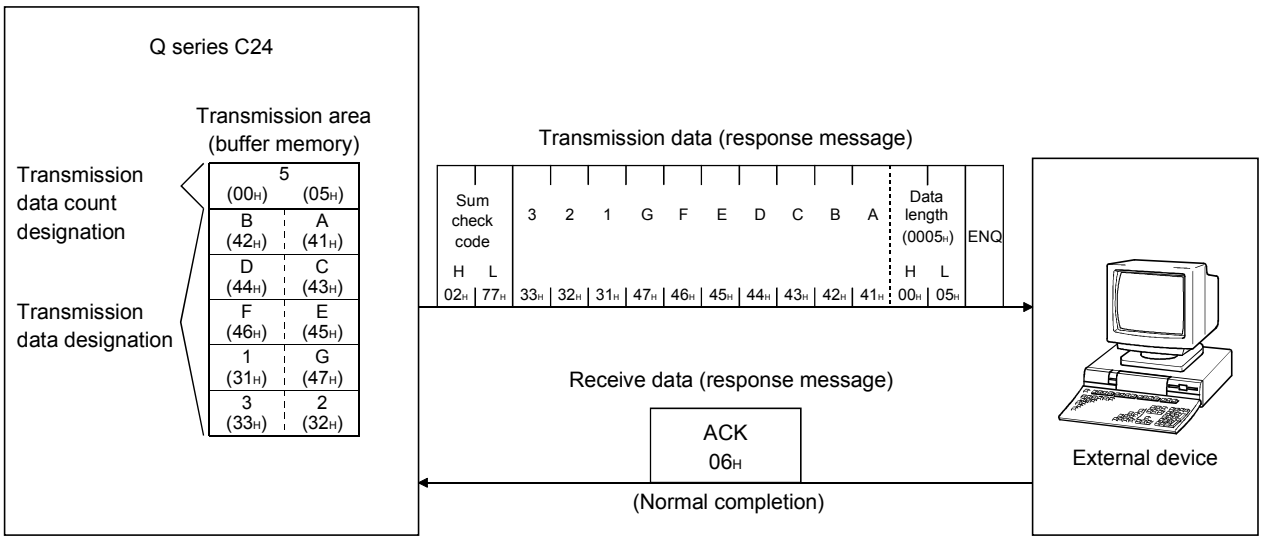
(Transmission data designation area) $\geqq$ (Size of data portion to be sent from the programmable controller CPU)

To transmit data whose size is larger than the transmission data designation area, increase the transmission area, or divide the transmission data before sending.

(2) Transmission data arrangement

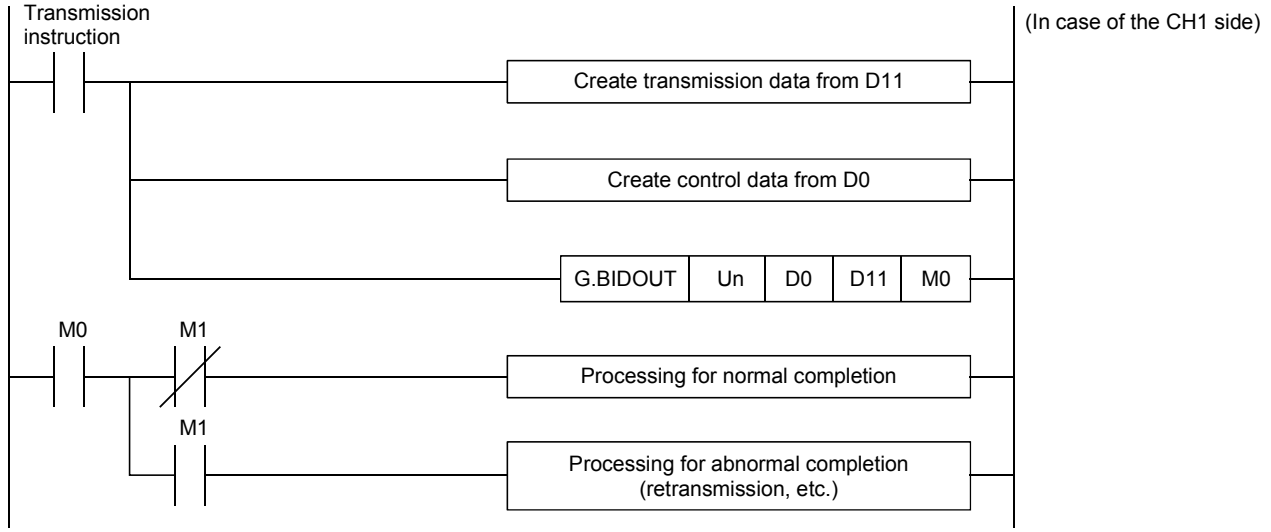
The following example shows an arrangement of the transmission data to be sent to the external device when storing it in the transmission area.

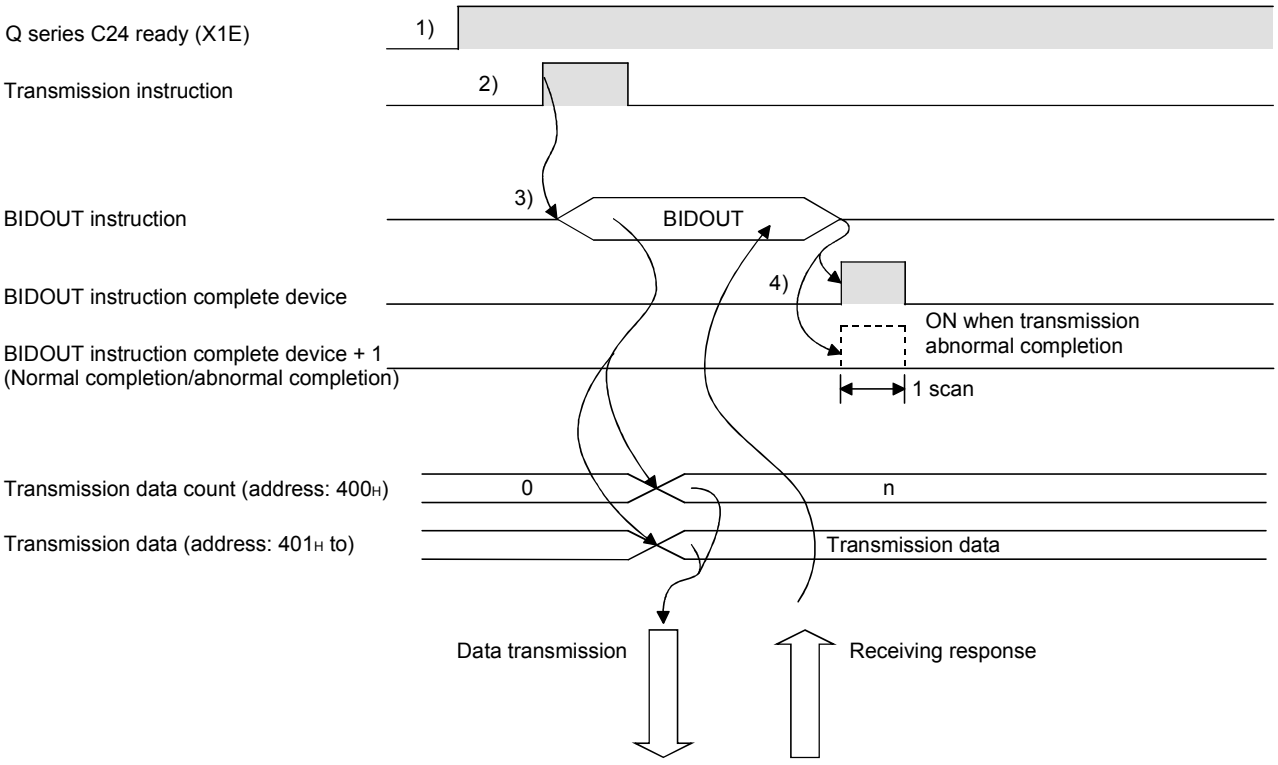
(Example) When "ABCDEFG123" is sent:



7.2.3 Sequence program for data transmission

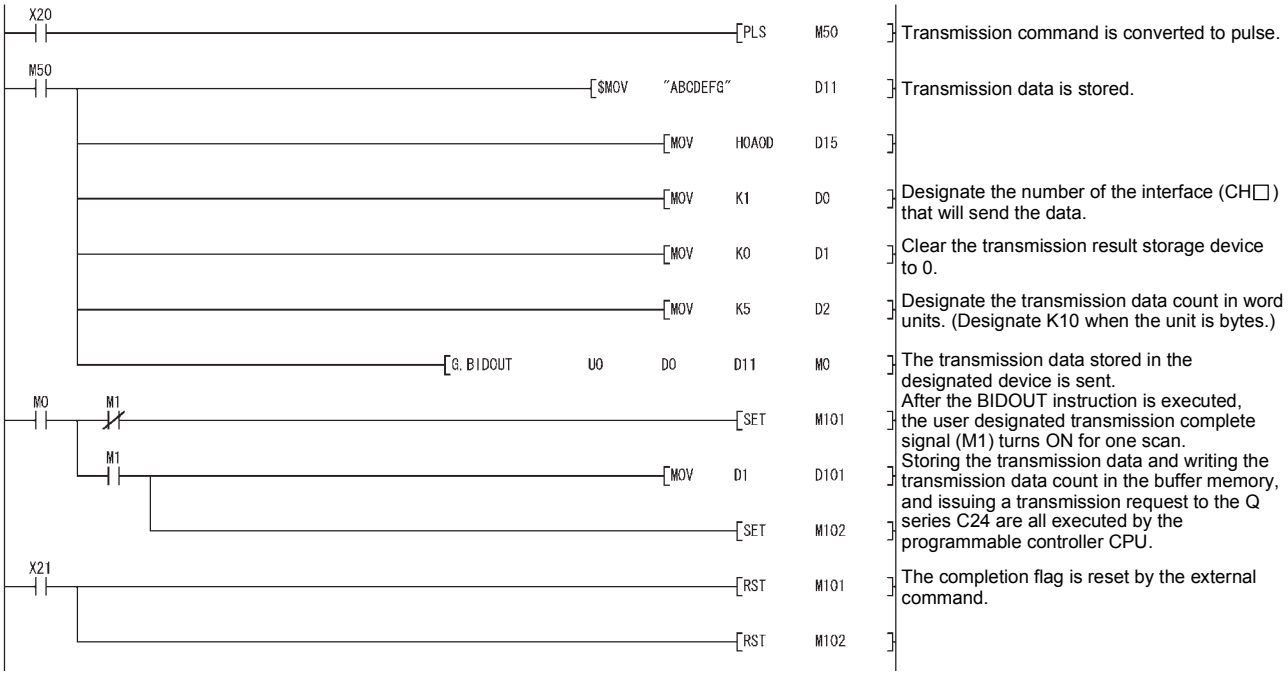
A sequence program for data transmission is explained below.
For details on the BIDOUT instruction for data transmission, see Chapter 10.

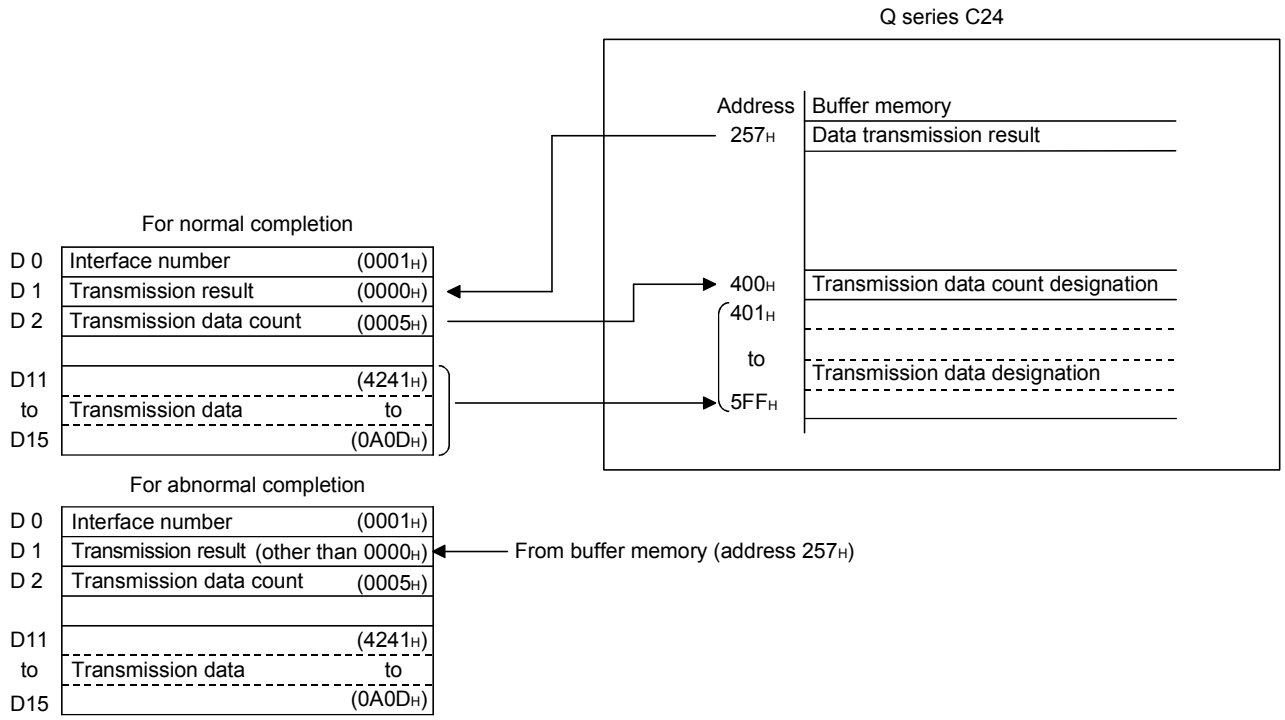




1) Starts the local station programmable controller.
   The setting values for GX Developer are stored in the Q series C24.
2) Inputs the user data transmission instruction signal.
3) Executes the BIDOUT instruction after storing the transmission data and the control data for the BIDOUT instruction in the device.
   Data is sent when the BIDOUT instruction is executed.
4) A response message for the data transmission (for normal completion: ACK message; for abnormal completion: NAK message) is received.
5) When the response is received, the Q series C24 transmission processing completes and the device that has completed the BIDOUT instruction turns ON.
   When the BIDOUT instruction ends abnormally due to the reception of an NAK message, the complete device +1 (abnormal completion signal) turns ON and the error code is stored in the control data completion status (S1+1).

(Program example)
When Q series C24 I/O signals are from X/Y00 to X/Y1F:


X20
PLS M50
Transmission command is converted to pulse.
M50
$MOV "ABCDEFG" D11
Transmission data is stored.
MOV H0A0D D15
MOV K1 D0
Designate the number of the interface (CH□) that will send the data.
MOV K0 D1
Clear the transmission result storage device to 0.
MOV K5 D2
Designate the transmission data count in word units. (Designate K10 when the unit is bytes.)
G.BIDOUT U0 D0 D11 M0
The transmission data stored in the designated device is sent.
M0 M1
SET M101
After the BIDOUT instruction is executed, the user designated transmission complete signal (M1) turns ON for one scan.
M1
MOV D1 D101
Storing the transmission data and writing the transmission data count in the buffer memory, and issuing a transmission request to the Q series C24 are all executed by the programmable controller CPU.
SET M102
X21
RST M101
The completion flag is reset by the external command.
RST M102



POINT

(1) The SPBUSY instruction is used to read the execution status when using a dedicated instruction. (See Chapter 10.)

(2) More than one BIDOUT instruction cannot be executed simultaneously. Execute the next BIDOUT instruction only after the execution of the first BIDOUT instruction is completed.

7.2.4 How to detect transmission errors

This section explains how to detect errors that may occur when sending data to the external device.

The following items are considered as the primary causes of errors that may occur during data transmission.

Cause of transmission error	Reference section
A transmission error occurred because of noise.	—
A timeout occurred for the no-reception monitoring time (timer 0).	User's Manual (Application)
A timeout occurred for the response monitoring time (timer 1).	
A timeout occurred for the transmission monitoring time (timer 2).	
Data that could not be converted with the ASCII-BIN conversion was detected.	
Designated the transmission data count that exceeded the transmission area size.	Section 7.2.2
Simultaneous transmissions occurred.	Section 7.3

(1) Confirmation using the sequence program

(a) Detecting a transmission error

1) he following device and input signal turn ON.
   - BIDOUT instruction complete device + 1
   - ERR. occurrence (XE/XF)
2) The transmission error code can be checked using the BIDOUT instruction control data ((S1) + 1).
   Or, it can be checked by reading the data transmission result (address: 257H/267H).
   For details on how to check the error code contents and corrective actions, see Chapter 11.

(b) How to turn off the ERR LED and clear the error code (see Section 11.1.2)

1) To turn off only the ERR LED, write a "1" to the Communication error clear request and to turn LED off (address: 0H/1H).
2) To turn off the ERR LED and clear the error code, turn ON the ERR. clear request (YE/YF).
   (Example) To perform the ERR LED OFF and the error code clear on the CH1 side:



(2) Confirmation using the module and GX Configurator-SC

1) Confirmation using the display LED
   When the Q series C24 detects an error, including a reception error, the ERR LED lights up. (See Chapter 11.)
2) Confirmation using GX Configurator-SC
   - The monitor function is used to check for errors. (See Sections 9.6.3 and 9.6.6.)
   - The ERR LED is turned off with the ERR LED OFF function. (See Section 9.6.11.)
3) Confirming the error code
   Use one of the following to confirm the error code.
   - GX Configurator-SC monitor function (See Section 9.6.6.)
   - GX Developer buffer memory monitor function (monitors addresses 257H/267H)

7.3 Processing when Simultaneous Transmission Performed During Full-Duplex Communications

This section explains the processing when simultaneous transmissions occur in full-duplex communication.

7.3.1 Processing when simultaneous transmissions occur

This section explains the processing performed by the Q series C24 when the external device and the Q series C24 transmit at the same time during data communications using the bidirectional protocol.
Because the external device and the Q series C24 do not transmit at the same time during half-duplex communications (see the User's Manual (Application)), this section does not have to be read.

When an external device and the Q series C24 transmit at the same time, the Q series C24 processing depends on the setting of "Simultaneous transmission data valid/invalid designation" with GX Configurator-SC.

* The GX Configurator-SC setting value, "Simultaneous transmission data valid/invalid designation" is stored in the following areas of the buffer memory.
  Simultaneous transmission data valid/invalid designation (addresses: $9B_H$/$13B_H$)
  The Q series C24 communication data processing for each setting is described in Section 7.3.2.

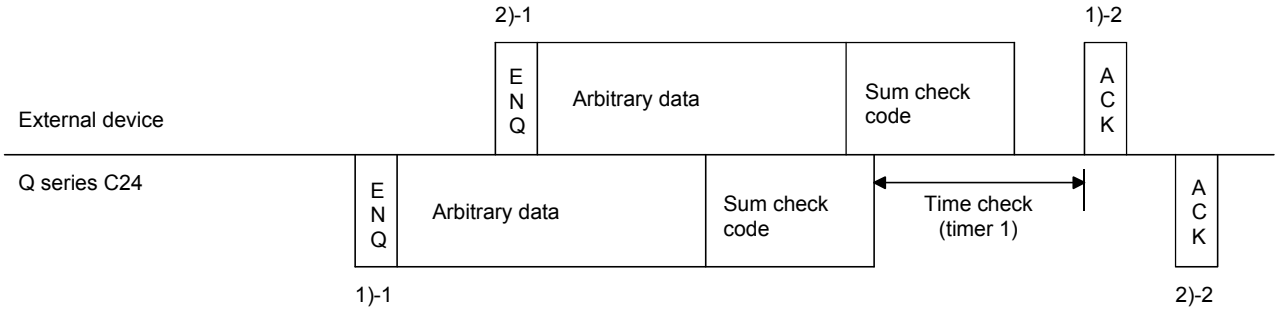
Setting contents with GX Configurator-SC	Value set to buffer memory (Address $9B_H$/$13B_H$)	Q series C24 processing contents	
		Message transmit processing	Message receive processing
Transmission data: Valid Receive data: Valid	0000_H	Waits to receive the response message (1)-2) while checking time-out after data transmission (1)-1) is complete. Posts normal end or abnormal end according to whether or not the programmable controller CPU received a response message through the buffer memory.	Transmits a response message (2)-2) after data reception (2)-1) is complete. Posts the receive data and receive result to the programmable controller CPU through the buffer memory.
Transmission data: Invalid Receive data: Valid	0100_H	Posts a simultaneous transmission error to the programmable controller CPU through the buffer memory after data transmission (1)-1). Does not wait for a response massage (1)-2) in reply to data transmission (1)-1).	Transmits a response message (2)-2) after data reception (2)-1) is complete. Posts the receive data and receive result to the programmable controller CPU through the buffer memory.
Transmission data: Valid Receive data: Invalid	0001_H	Waits to receive the response message (1)-2) while checking time-out after data transmission (1)-1) is complete. Posts normal end or abnormal end according to whether or not the programmable controller CPU received a response message through the buffer memory.	Ignores data reception (2)-1) and discards the received data. Does not transmit a response message (2)-2). Does not inform the programmable controller CPU that data was received.
Transmission data: Invalid Receive data: Invalid	0101_H	Posts a simultaneous transmission error to the programmable controller CPU through the buffer memory after data transmission (1)-1). Does not wait to a response massage (1)-2) in reply to data transmission (1)-1).	Ignored data reception (2)-1) and discards the receive data. Does not transmit a response message (2)-2). Does not inform the programmable controller CPU that data was received.

( )-m) is the number showing the correspondence with the messages in the illustration shown in Section 7.3.2.

7.3.2 Communication data processing when simultaneous transmissions occur

Examples of the Q series C24 communication data processing for various settings of "Simultaneous transmission data valid/invalid designation" by GX Configurator-SC are explained.

(1) Transmission: valid, reception: valid

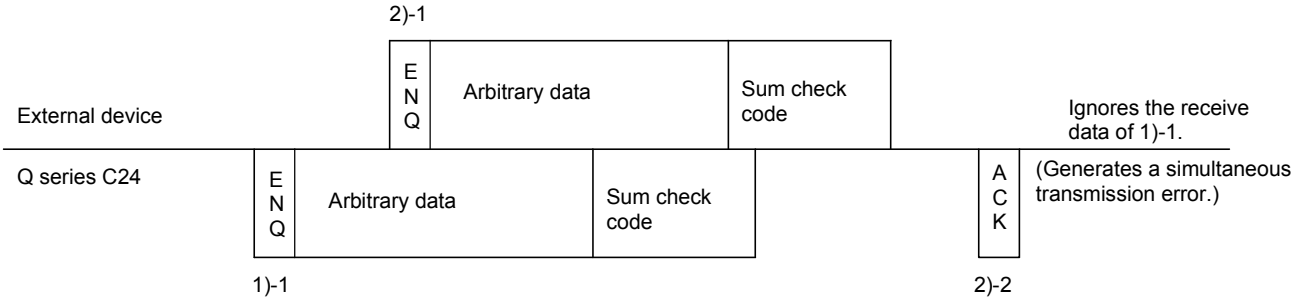


POINT

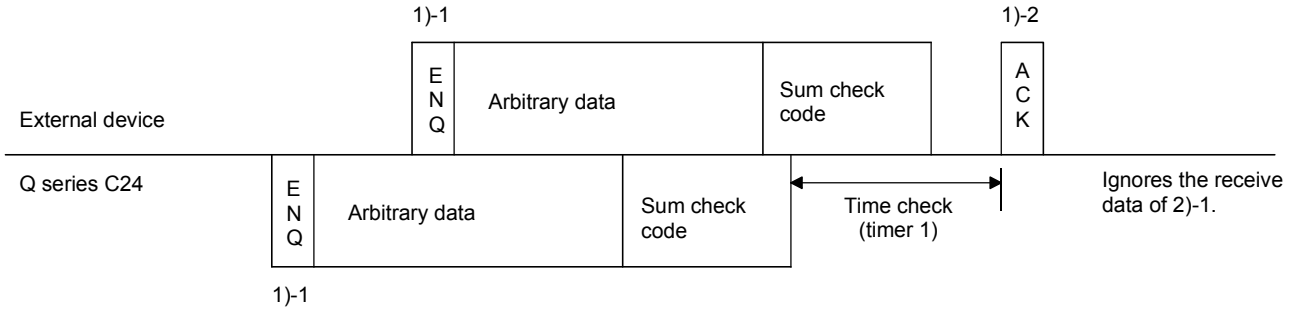
When the entire message of 2)-1 was received while transmitting the message of 1)-1 in the illustration.

- The Q series C24 sets Receive read request (X3/X4) of 2)-1 to ON after sending all of 1)-1.

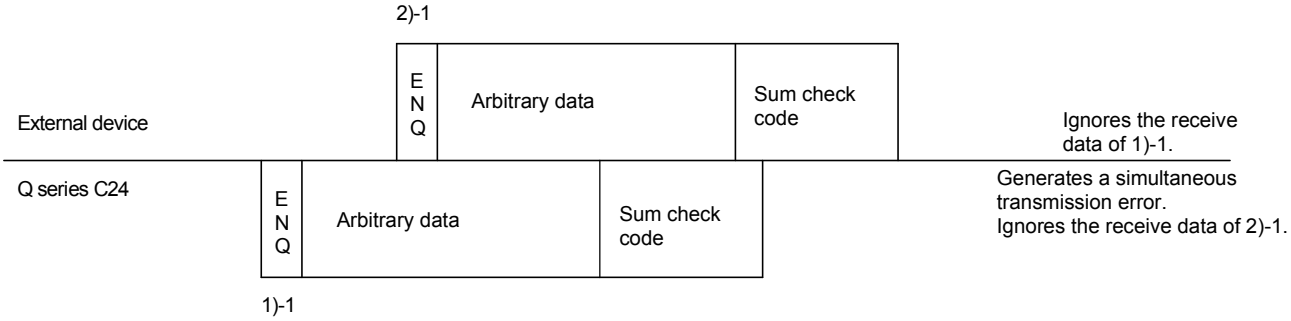
(2) Transmission: invalid, reception: valid



(3) Transmission: valid, reception: invalid



(4) Transmission: invalid, reception: invalid



REMARKS

Time-check timer 1 (response monitoring time) shown in the illustration is described in the User's Manual (Application).

POINT

When the transmission control (see User's Manual (Application)) is performed, and the simultaneous transmission data valid/invalid designation sets that the receive data is valid and transmission data is valid, the Q series C24 performs message transmission and message reception processing as described below.
During message transmission processing, time check by timer 1 (response monitoring time) is performed.

1) Message transmission (1)-1 in the illustration)
   - If the Q series C24 receives a terminate transmission request (DC3 received/DR(DSR) signal OFF) from the external device during message transmission, it terminates data transmission.
   - When the Q series C24 receives the ready to send signal (DC1 received/ DR(DSR) signal ON), it restarts data transmission.
2) Message reception
   - If the Q series C24 cannot send a response message to the external device in response to message reception because the external device issued a terminate transmission request (DC3 received/DR(DSR) signal OFF), it transmits the response message after it receives the ready to send signal (DC1 received/DR(DSR) signal ON) from the external device.

7.4 Data Communications Precautions

The following are the precautions when performing data communications using the bidirectional protocol.

(1) When the transmission sequence is in the initial status, it indicates that data transmission and reception processing has not been started.
The Q series C24 transmission sequence is initialized in the following cases.
- The power is turned on, the CPU is reset.
- When operating, or the mode is switched.
- When a response message (ACK, NAK, etc.) was received in reply to data transmission.
- When a response message (ACK, NAK, etc.) was transmitted in reply to data reception.
- When the CD(DCD) signal was turned off during data communications using Check CD terminal in full-duplex communications through the RS-232 interface.

(2) As a data transmission procedure, data transmission from the external device or the Q series C24 should be performed after a response for the immediately preceding data transmission has been received.

(3) The external device and programmable controller CPU must agree so that the units of the data length (word count/byte count) in the message to be transmitted and received is the same.
The programmable controller CPU units can be set using the GX Configurator-SC word/byte units designation.
Make the length of the data area in the message to be transmitted and received the size of the Q series C24 buffer memory transmission data designation area and receive data storage area, or less.

(4) NAK code response
1) Response from the Q series C24 to external device
After the error detection message reception complete, it transmits the NAK code to the external device.
2) Response from external device to the Q series C24
Transmit the error code (0022_H to $005F_H$) immediately after the NAK response.

POINT

(1) Perform error processing according to the error code received immediately after the NAK message at the device that received NAK as the response message after data transmission.
Chapter 11 shows the error codes that are transmitted from the Q series C24.

(2) If the Q series C24 receives an NAK response while transmitting data to an external device, it completes data transmission, then reads the NAK, perform abnormal completion.

(3) If the Q series C24 detects an error while receiving data, it ignores the receive data corresponding to the data length.
If the data length is abnormal, the Q series C24 ignores all the data up to the receive message head data (ENQ, etc.) received thereafter.

(5) External device time-out check
When checking time-out up to reception of the response message at the external device during data transmission from external device to the Q series C24, make the time-out time the time shown below, or longer.
(Programmable controller CPU maximum scan time × 2) + 100 ms

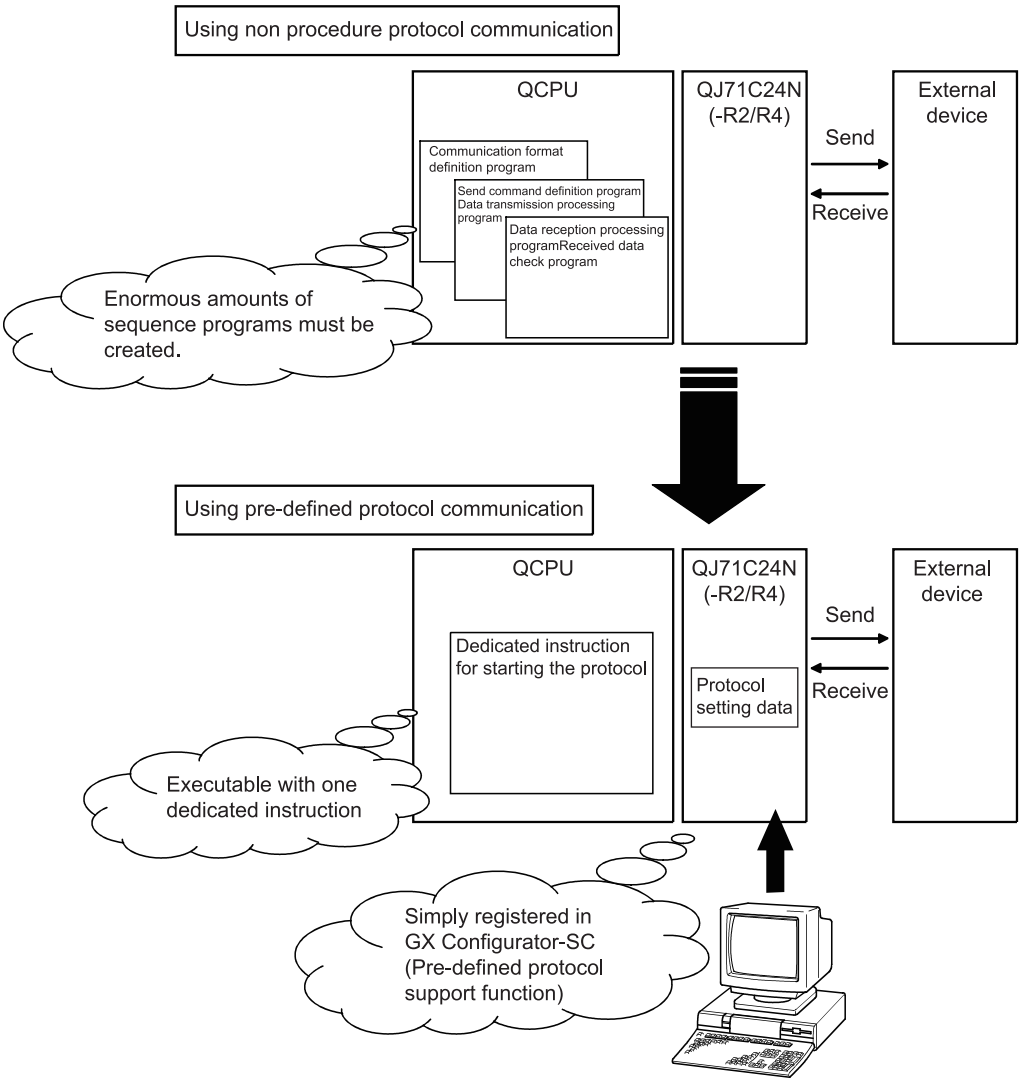
(6) External device framing error
When nothing is transmitted from the Q series C24 to the external device though the RS-422 or RS-422/485 interface, a framing error may be generated in the external device.
Make the external device skip the data up to transmission of the head data (ENQ, NAK, etc.) of the message from the Q series C24.
Before communicating data through the RS-422/485 interface, check Q series C24 specifications given in Section 3.3.

(7) Data bit settings
When adding a sum check code to a message, set the data bits to 8 bits using the transmission setting of GX Developer.
For more details on the data bit settings, see Section 4.5.

8 DATA COMMUNICATION USING THE PRE-DEFINED PROTOCOL

Data can be transferred between the QJ71C24N(-R2/R4) and an external device using GX Configurator-SC (Pre-defined protocol support function) with a protocol appropriate to the external device.
Protocols can be selected from the pre-defined protocol library offered or can be created and edited arbitrarily.
Since registered setting data are written to a flash ROM, the program volume in a programmable controller CPU can be reduced.

(1) Data communication using the pre-defined protocol



For details, refer to the following manual.
Operating Manual (Pre-defined protocol support function)

POINT

(1) A protocol used in the pre-defined protocol function is a means for communicating with an external device.
It comprises of the following information:
• Packet element (packet format)
• Packet data
• Communication type (Send only, Receive only, or Send and receive)

(2) The function cannot be used when the QJ71C24N(-R2/R4) is used with the following modules.
• Redundant CPU
• C Controller module
• MELSECNET/H remote I/O station

(2) Numbers of protocols and packets that can be registered

The following are the maximum numbers of protocols and packets that can be registered.

- Protocols: Up to 128
- Packets: Up to 256

Once a protocol is registered, a packet determined for each protocol is registered to the packet data area.
Because of this, the available number of protocols is 127 or less when:

1) The number of registered packets reached the maximum (256).
2) The usage rate of the packet data area reached 100%.

The usage rate of the packet data area can be confirmed in GX Configurator-SC (Pre-defined protocol support function).
Note that the usage rate of the packet data area varies by protocol.

8.1 Function of the Pre-Defined Protocol

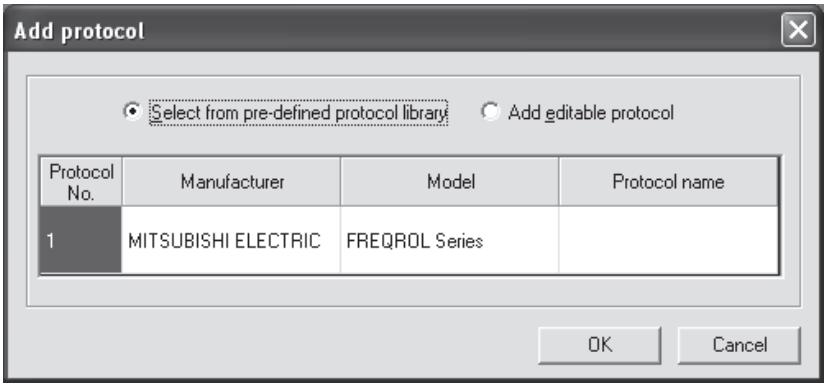
The function of the pre-defined protocol is listed below.

Function	Description	Reference
Data communication with external device	Data can be sent and received using the protocol of the external device.	Operating Manual (Pre-defined protocol support function)

8.1.1 Data communication procedure

By the following procedure taken in GX Configurator-SC (Pre-defined protocol function), data can be exchanged with an external device.

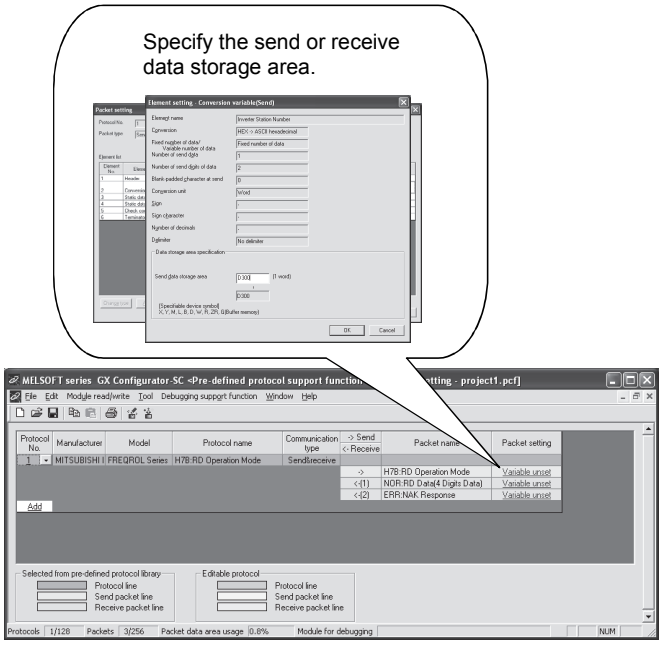
Step 1: Register the protocol of the external device.



In the "Add protocol" dialog box, select "Select from pre-defined protocol library" or "Add editable protocol", and set necessary data.

↓

Step 2: Specify the send or receive data storage area.



Specify the send or receive data storage area.
Device or buffer memory data can be taken into communication packets, and thereby this protocol communication is suitable for data that may change every transmission.

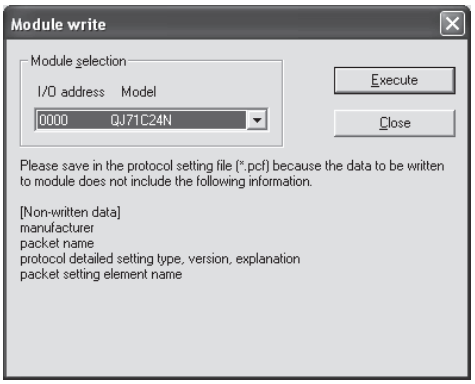
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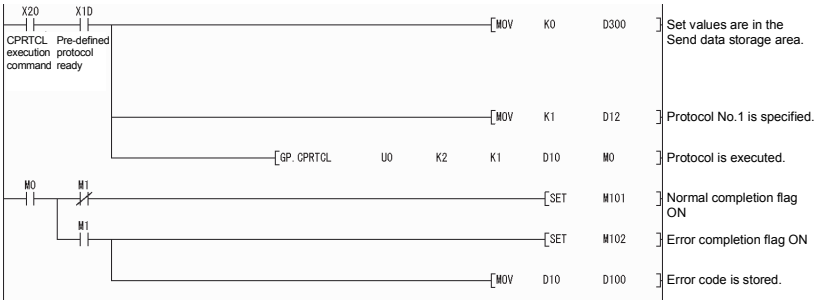
Step 3: Write the protocol setting data to the flash ROM.


Module write
Module selection
I/O address Model
0000 QJ71C24N
Execute
Close
Please save in the protocol setting file (*.pcf) because the data to be written to module does not include the following information.
[Non-written data]
manufacturer
packet name
protocol detailed setting type, version, explanation
packet setting element name

Select a target module, and write the protocol setting data to the flash ROM.

↓

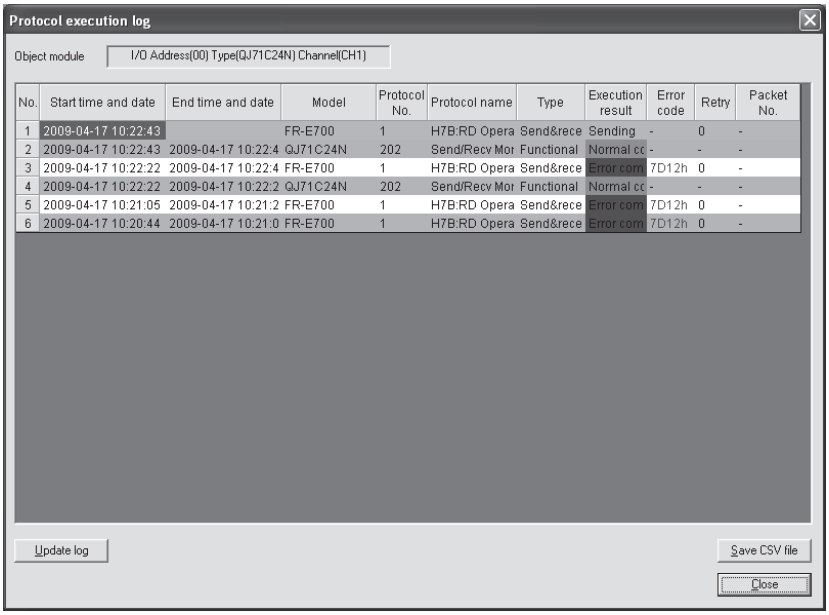
Step 4: Execute the protocol with a dedicated instruction.



With a dedicated instruction (CPRTCL), execute the protocol that was written to the flash ROM.

↓

Step 5: Confirm the protocol execution in the protocol execution log.


Protocol execution log
Object module
I/O Address(00) Type(QJ71C24N) Channel(CH1)
No. Start time and date End time and date Model Protocol No. Protocol name Type Execution result Error code Retry Packet No.
1 2009-04-17 10:22:43 FR-E700 1 H7B:RD Opera Send&rece Sending - 0 -
2 2009-04-17 10:22:43 2009-04-17 10:22:4 QJ71C24N 202 Send/Recv Mor Functional Normal co - - -
3 2009-04-17 10:22:22 2009-04-17 10:22:4 FR-E700 1 H7B:RD Opera Send&rece Error com 7D12h 0 -
4 2009-04-17 10:22:22 2009-04-17 10:22:2 QJ71C24N 202 Send/Recv Mor Functional Normal co - - -
5 2009-04-17 10:21:05 2009-04-17 10:21:2 FR-E700 1 H7B:RD Opera Send&rece Error com 7D12h 0 -
6 2009-04-17 10:20:44 2009-04-17 10:21:0 FR-E700 1 H7B:RD Opera Send&rece Error com 7D12h 0 -
Update log
Save CSV file
Close

In the Protocol execution log list, information of the executed protocol, such as protocol name, start and end times and dates, execution result, can be monitored. With the circuit trace function, communication data and control signal states can be also confirmed.

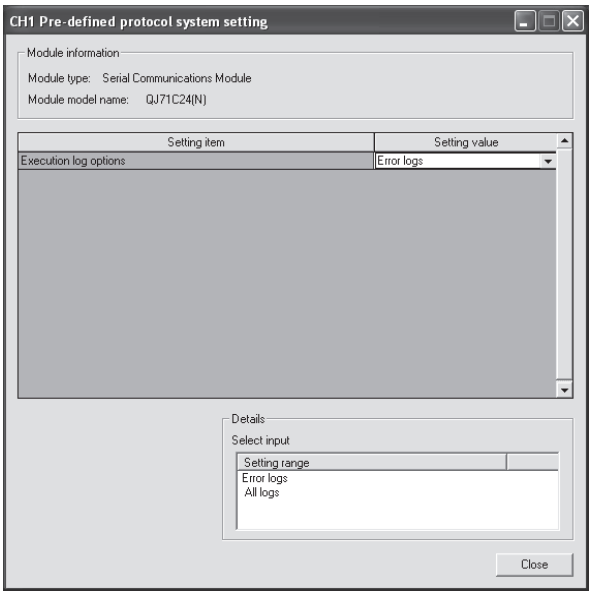
POINT

Communication using the modem function is not available for the pre-defined protocol.

8.1.2 Pre-defined protocol system setting

In the "Pre-defined protocol system setting" window of GX Configurator-SC (Intelligent function module utility), register the system setting value for data communication with the pre-defined protocol.
For information on how to display the setting screen, refer to Section 9.4.9.

[Setting screen]



[Setting item]

Item	Description
Execution log options	The condition for registering protocol execution logs can be specified. Error logs : Failed protocol execution logs are stored. All logs : The execution status and log of all protocols are stored.

[Setting procedure]

1) Select "Error logs" or "All logs" for "Execution log options".
2) Click Close.

POINT
For information on the stored logs, refer to Section 8.1.4.

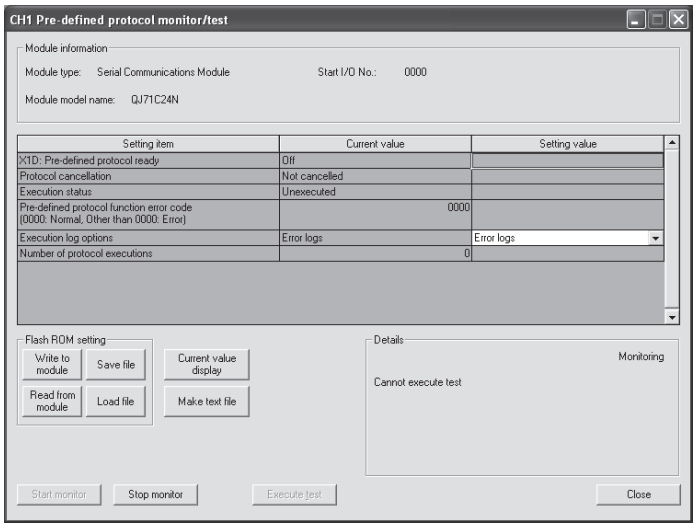
8.1.3 Pre-defined protocol monitoring/test

In the "Pre-defined protocol monitor/test" window of GX Configurator-SC (Intelligent function module utility), the pre-defined protocol execution status and an error code can be confirmed.

[Confirmation procedure]

1) Display the "Pre-defined protocol monitor/test" window.
   For information on how to display this window, refer to Section 9.6.7.
2) The current value of each item can be confirmed.

[Monitor/test window]



[Pre-defined protocol monitor/test items]

Item	Description	Reference
X1D: Pre-defined protocol ready	The ON/OFF status of X1D can be confirmed.	Section 8.1.5
Protocol cancellation	The cancel status of the pre-defined protocol can be confirmed.	Operating Manual (Pre-defined protocol support function)
Execution status	The protocol execution status can be confirmed.	Section 8.1.4
Pre-defined protocol function error code	An error code for the pre-defined protocol function can be confirmed.	Section 11.2.1
Execution log options	Condition for registering protocol execution logs can be confirmed and specified. The specification will take effect when the dedicated instruction (CPRTCL) is executed.	Section 8.1.4 Operating Manual (Pre-defined protocol support function)
Error logs	Failed protocol execution logs are stored.	
All logs	All protocol execution logs are stored.	
Number of protocol executions	The number of protocol executions can be confirmed.	Section 3.9

8.1.4 Protocol execution log storage function

The protocol execution log storage function allows you to confirm the detailed pre-defined protocol execution status and results for each channel.
Up to 32 protocol execution logs can be checked.
If the number of the stored logs exceeds 32, the oldest log will be overwritten.

(1) Checking methods

The following two checking methods are available.

(a) GX Configurator-SC (Pre-defined protocol support function)
The logs can be checked in the "Protocol execution log" dialog box.
For details, refer to the Operating Manual (Pre-defined protocol support function).

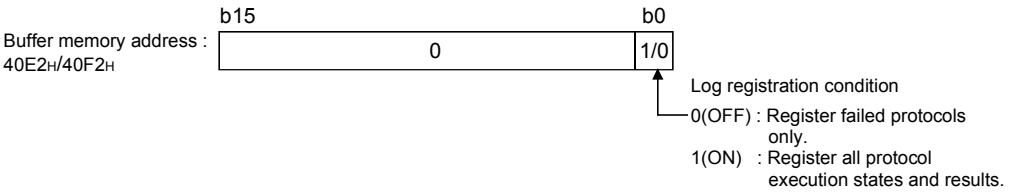
(b) Checking the buffer memory
The logs can be checked in the Execution log storage area (address: 4102H to 4701H (CH1), 4802H to 4E01H (CH2)).
For details, refer to Section 3.9.

POINT
Do not perform the above two methods at the same time. The latest execution logs are not in the buffer memory while they are being updated in GX Configurator-SC (Pre-defined protocol support function).

(2) Setting for protocol execution logs

Whether to store all protocol execution logs or only the failed protocols in the Execution log storage area can be specified.

The following shows how the Execution log options area (address: 40E2H/40F2H) in the buffer memory is set.



8.1.5 Executing Condition of Predefined Protocol Communication

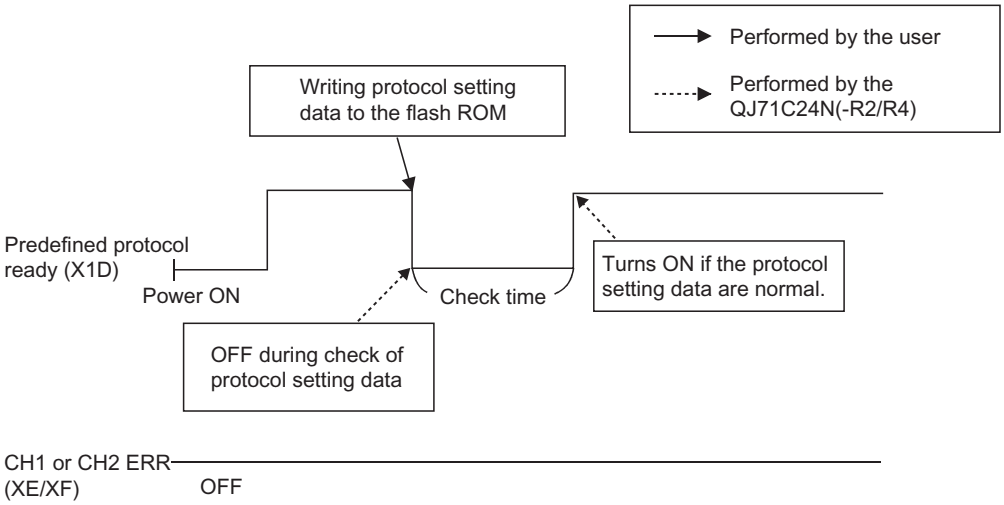
The predefined protocol communication can be executed when the predefined protocol ready (X1D) is on.
Use the signal as an interlock signal when executing the predefined protocol communication in the sequence program.

However, note that only the functional protocol can be executed when Predefined protocol ready (X1D) is off. (Refer to Section 10.7.1.)

This signal turns on only when the communication protocol setting is set to predefined protocol.

(1) ON/OFF timing of Predefined protocol ready (X1D)

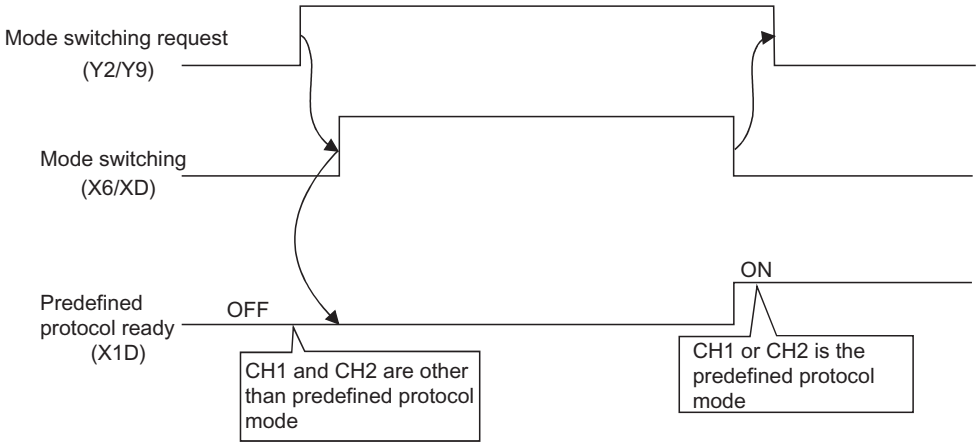
After the protocol setting data is written to a flash ROM, X1D turns off while checking the written data.
X1D turns on when the written data are normal.


Performed by the user
Performed by the QJ71C24N(-R2/R4)
Writing protocol setting data to the flash ROM
Predefined protocol ready (X1D)
Power ON
Check time
Turns ON if the protocol setting data are normal.
OFF during check of protocol setting data
CH1 or CH2 ERR (XE/XF)
OFF

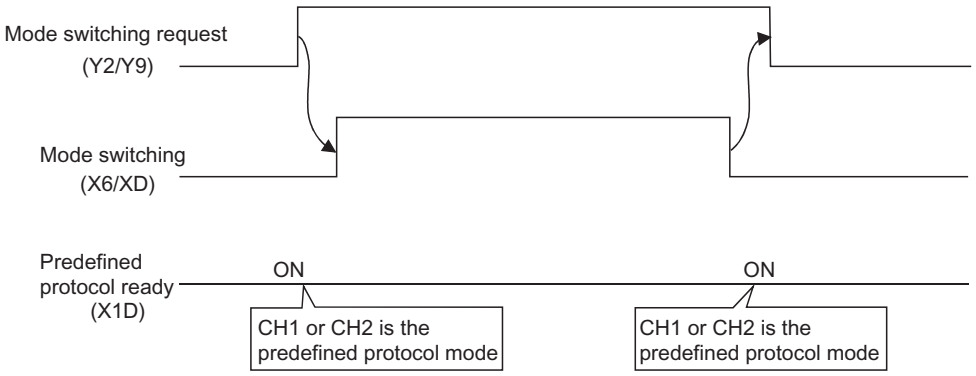
(2) Timing for executing the UINI instruction or mode switching request signal (Y2/Y9) *1

(a) Timing for executing mode switching request signal (Y2/Y9)

Communication protocol before change:
CH1 and CH2 are other than the predefined protocol mode.
Communication protocol after change:
CH1 or CH2 is the predefined protocol mode.

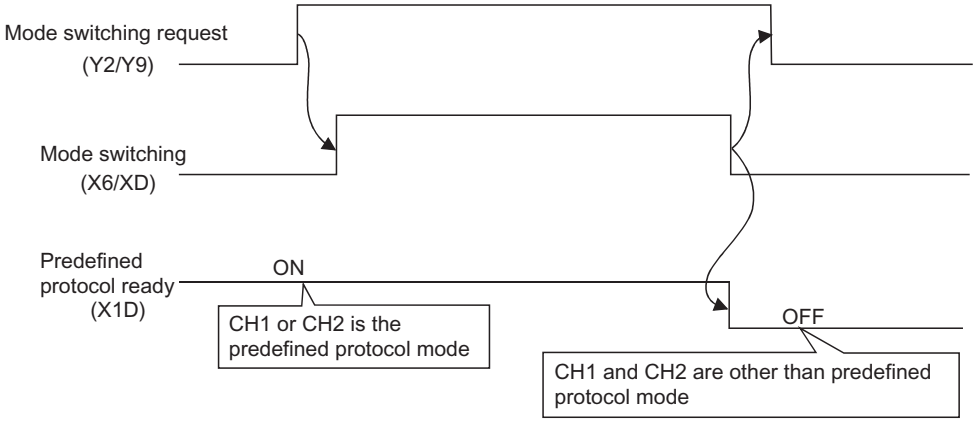


Communication protocol before change:
CH1 or CH2 is the predefined protocol mode.
Communication protocol after change:
CH1 or CH2 is the predefined protocol mode.



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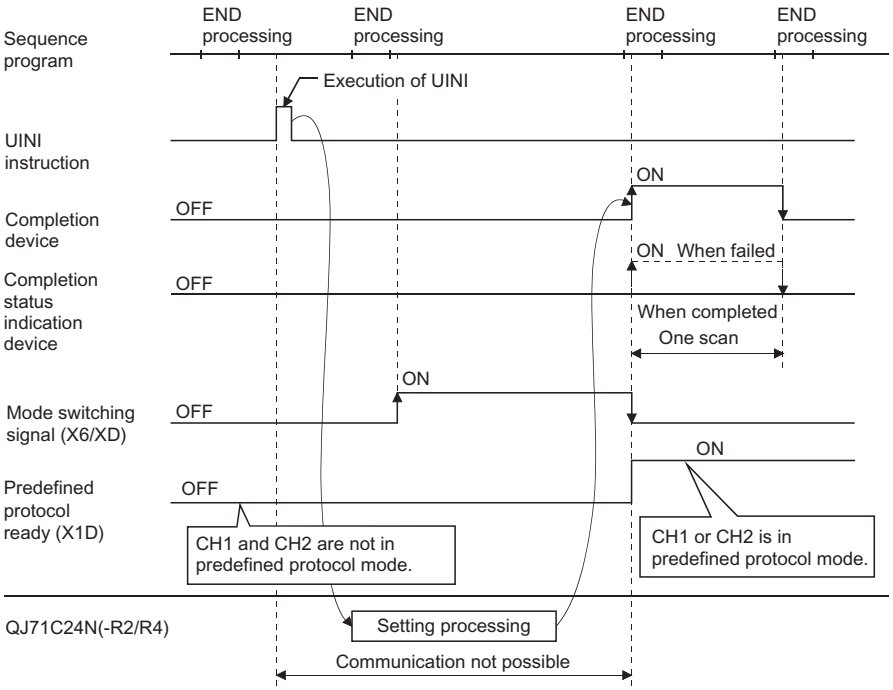
Communication protocol before change:
CH1 or CH2 is the predefined protocol mode.
Communication protocol after change:
CH1 and CH2 are other than the predefined protocol mode.



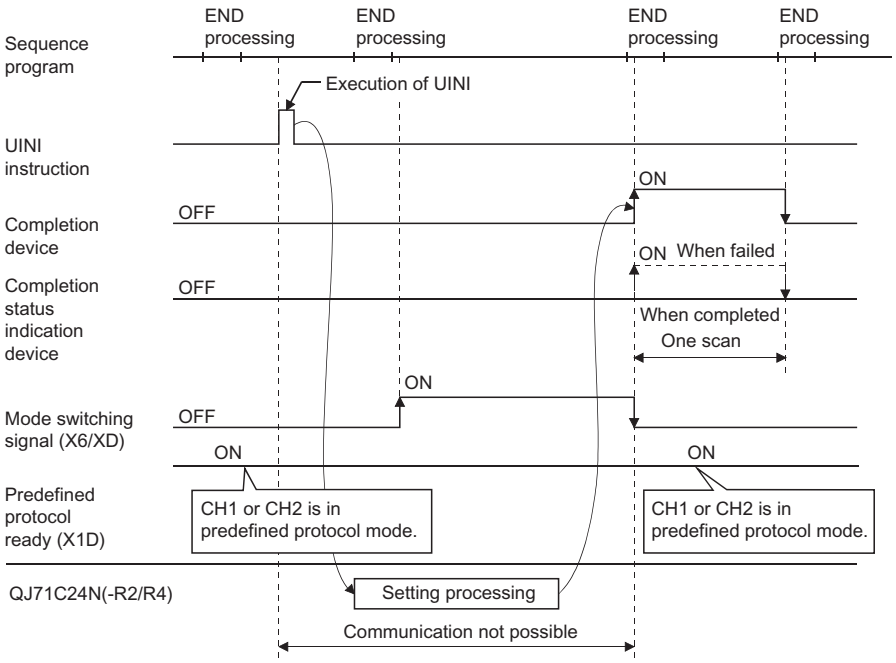
∗1 Based on either of the following condition; the protocol setting data written to the flash ROM are normal, or the protocol setting data are not written to the flash ROM.

(b) Timing for executing the UINI instruction

Communication protocol before change:
CH1 and CH2 are other than the predefined protocol mode.
Communication protocol after change:
CH1 or CH2 is the predefined protocol mode.

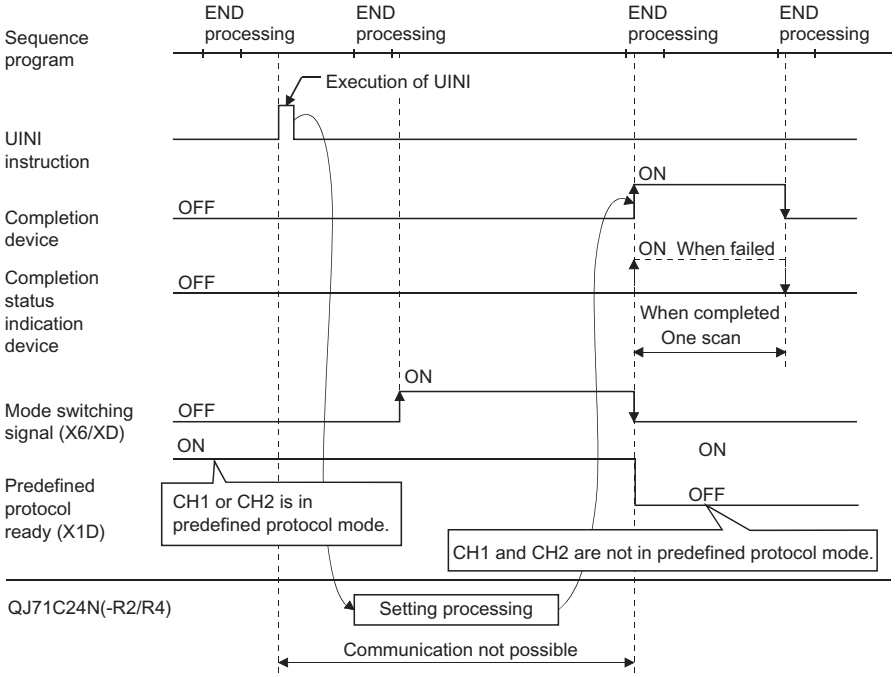


Communication protocol before change:
CH1 or CH2 is the predefined protocol mode.
Communication protocol after change:
CH1 or CH2 is the predefined protocol mode.



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Communication protocol before change:
CH1 or CH2 is the predefined protocol mode.
Communication protocol after change:
CH1 and CH2 are other than the predefined protocol mode.



8.1.6 Programming Example

This section describes the programming example and the setting example of the predefined protocol function.
For the setting example, the pre-defined protocol support function of GX Developer and GX Configurator-SC is used. Serial communication module QJ71C24N and Mitsubishi inverter (FREQROL-A700, described as inverter or FR-A700 hereafter) as a connection target device are used in this setting example.

(1) System configuration/wiring example

The system configuration and wiring example are as follows.

(a) System configuration example

The QJ71C24N to be used should be mounted on the slot 0 on the base unit and connected to the external device on a one-on-one basis using CH2 via RS-422/485 line.
For details of the system configuration, refer to Chapter 2.

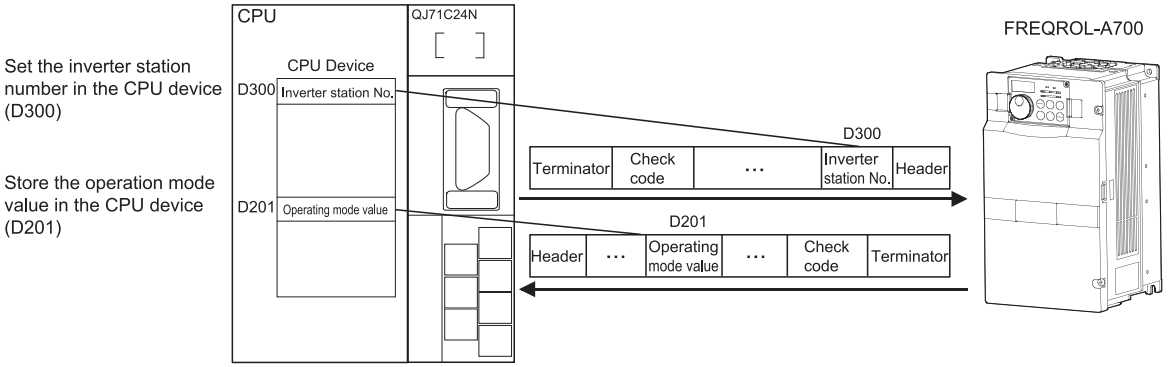
(2) Communication data

In the program example, the predefined protocol communication described below is performed between QJ71C24N and the target device.

(a) Target device and protocols

Connect the QJ71C24N and the inverter and read out the operation mode values of the inverter.

Set the inverter station number to CPU device (D300) and send it, and store the operation mode value in CPU device (D201).



Manufacturer	Mitsubishi Electric
Device name	FR-A700
Protocol name	H7B:RD Operation Mode

(b) Storage devices for send/receive data, buffer memory assignment

Specify the device memory of a CPU module and buffer memory as the data storage areas as listed in the table below, and send/receive data.

Packet name	Element name	Packet type	Data storage area specification
H7B:RD Operation Mode	Inverter Station Number	Send packet	D300
NOR:RD Data(4 Digits Data)	Inverter Station Number	Receive packet	D200
	Read Data		D201
ERR:NAK Response	Inverter Station Number	Receive packet	D202
	Error Code		D203

(3) Communication settings

(a) Settings on GX Developer

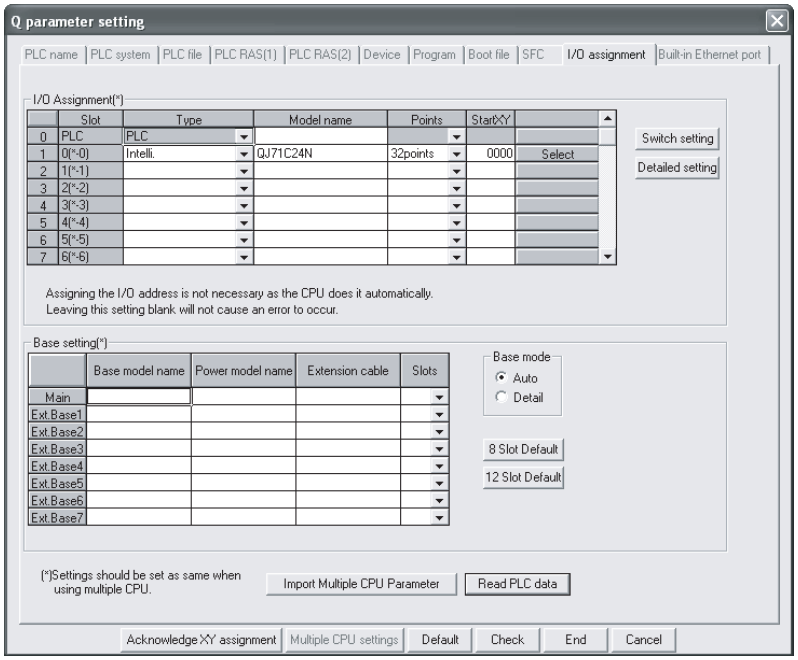
This section explains the settings required for executing the predefined protocol communication on GX Developer.
For details, refer to the GX Developer Operating Manual.

- I/O assignment

  For the I/O assignment setting, the types and the I/O signal range of each module mounted on a base unit are set.

  1) On the project window on GX Developer, double-click "PLC Parameter".
  2) Click the "I/O assignment" tab.
  3) Set the following items on the slot where the QJ71C24N has been mounted.

[Setting screen]



[Display details]

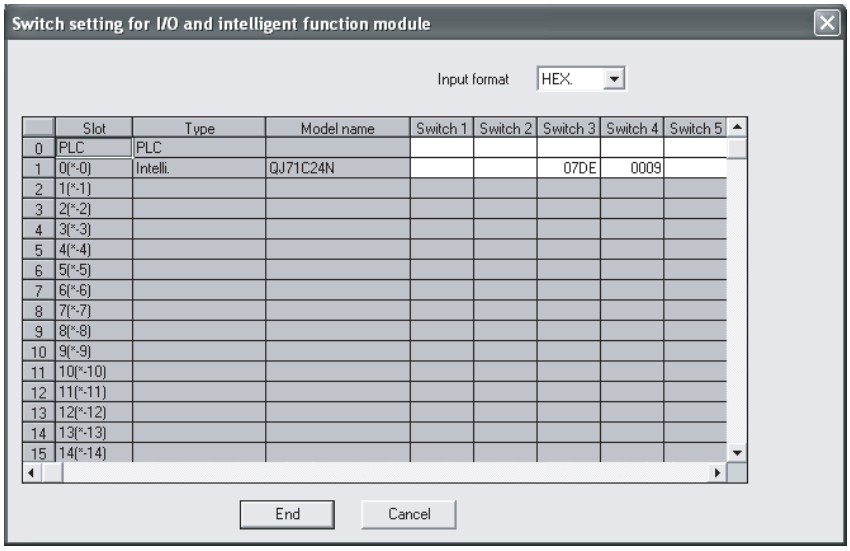
Item	Description
Type	Select "Intelli".
Model name	Select "QJ71C24N".
Points	Select "32 points".
Start XY	Enter 0000.

4) On "I/O assignment", click the Switch setting button.
   The window shown on the next page appears.

- Switch setting for intelligent function module

  Set the transmission specifications and communication protocols with external devices.

  1) Set items as follows and click the End button.



[Display details]

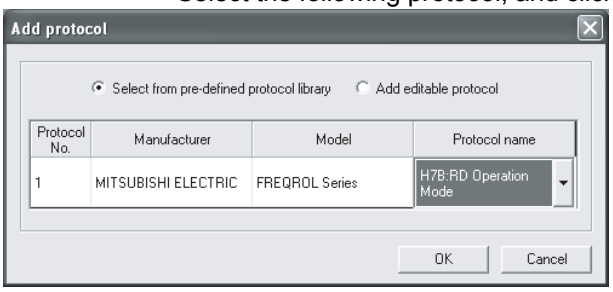
Item	Setting value	Setting details	
Input format	HEX.	Set the input format to hexadecimal.	
Switch 1	—	—	
Switch 2	—	—	
Switch 3	07DE	CH2 Communication rate setting: 19200bps	
		CH2 Transmission setting	Operation setting: Independent
			Data bit: 8
			Parity bit: Exist
			Even/odd parity: Even
			Stop bit: 2
			Sum check code: Disable
			Online change: Enable
			Setting modifications: Allowed
Switch 4	0009	CH2 Communication protocol setting: Predefined protocol	
Switch 5	—	—	

(b) Setting on GX Configurator-SC (pre-defined protocol support function)
Set the protocol explained in Section 13.5.2.

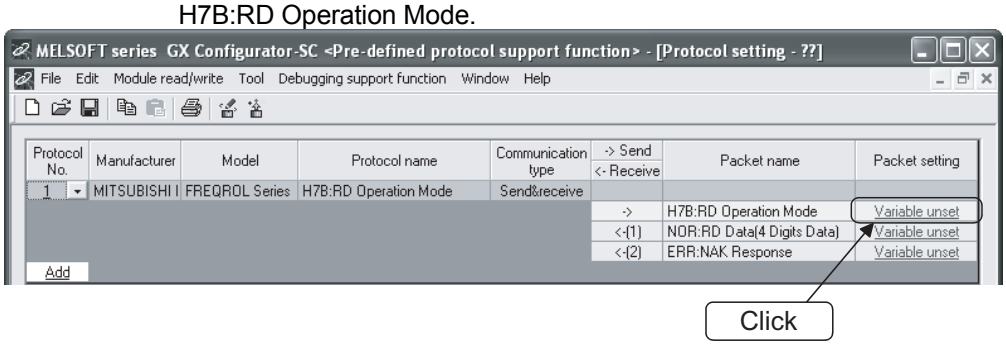
1) From the menu bar, select [File]→[New].



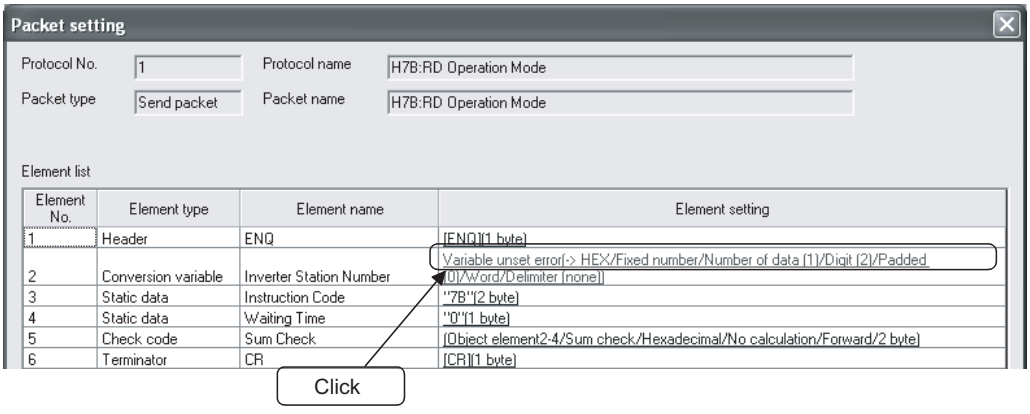
2) The "Add protocol" screen is displayed.
Select the following protocol, and click the OK button.



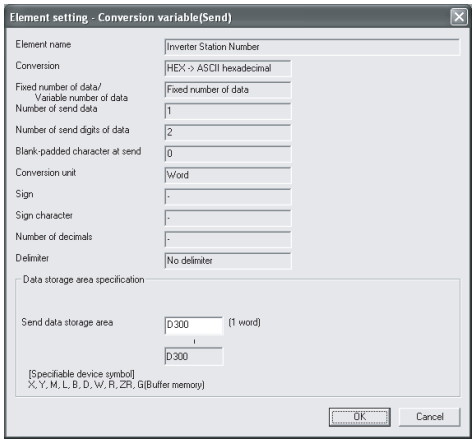
3) The "Protocol setting" screen is displayed.
Click the cell under "Packet setting" (displayed in red) of "Packet Name" H7B:RD Operation Mode.



4) The "Packet setting" screen is displayed.
Click the cell under "Element setting" (displayed in red) on the Element No. 2.

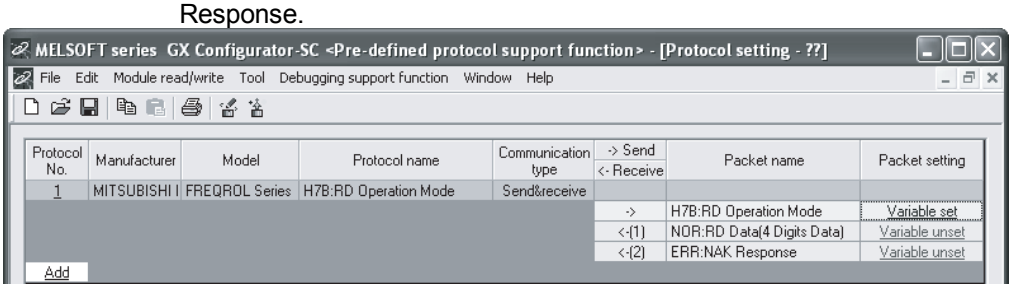

Packet setting
Protocol No. 1
Protocol name H7B:RD Operation Mode
Packet type Send packet
Packet name H7B:RD Operation Mode
Element list
Element No.
Element type
Element name
Element setting
1 Header ENQ [ENQ](1 byte)
2 Conversion variable Inverter Station Number Variable unset error(-> HEX/Fixed number/Number of data (1)/Digit (2)/Padded (0)/Word/Delimiter [none])
3 Static data Instruction Code "7B"(2 byte)
4 Static data Waiting Time "0"(1 byte)
5 Check code Sum Check [Object element2-4/Sum check/Hexadecimal/No calculation/Forward/2 byte]
6 Terminator CR [CR](1 byte)
Click

5) The "Element setting – Conversion variable" screen is displayed.
In the "Send data storage area" field, enter "D300". Click the OK button.



6) The "Packet setting" screen is displayed.
The packet setting of "Packet name" H7B:RD Operation Mode has been completed. Click the Close button.

7) The "Protocol setting" screen is displayed.
Repeat the steps 3) to 6) described above to configure the packet setting of "Packet name" NOR:RD Data(4 Digits Data) and ERR:NAK Response.

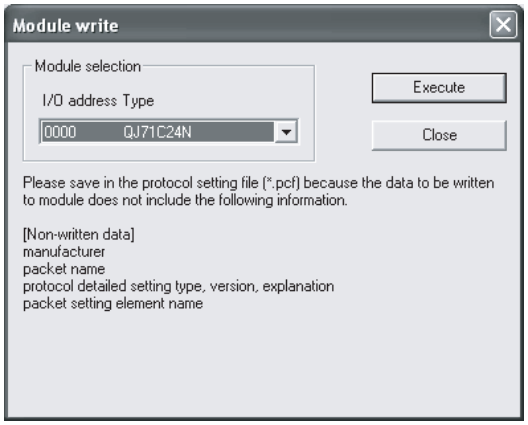


In "Data storage area", enter the following values.

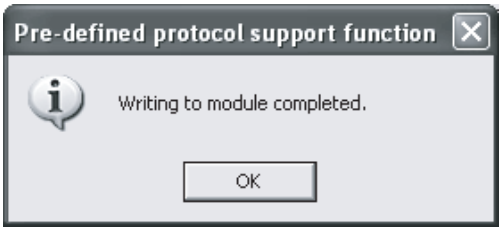
Packet name	Element No.	Element name	Data storage area specification
NOR:RD Data (4 Digits Data)	2	Inverter Station Number	Enter D200.
	3	Read Data	Enter D201.
ERR:NAK Response	2	Inverter Station Number	Enter D202.
	3	Error Code	Enter D203.

(c) Writing data to module

1) Select [Module read/write] → [Write to module].
Select the following module and click the Execute button.


Module write
Module selection
I/O address Type
0000 QJ71C24N
Execute
Close
Please save in the protocol setting file (*.pcf) because the data to be written to module does not include the following information.
[Non-written data]
manufacturer
packet name
protocol detailed setting type, version, explanation
packet setting element name

2) The following confirmation message is displayed when writing the protocol setting data to the module is completed.

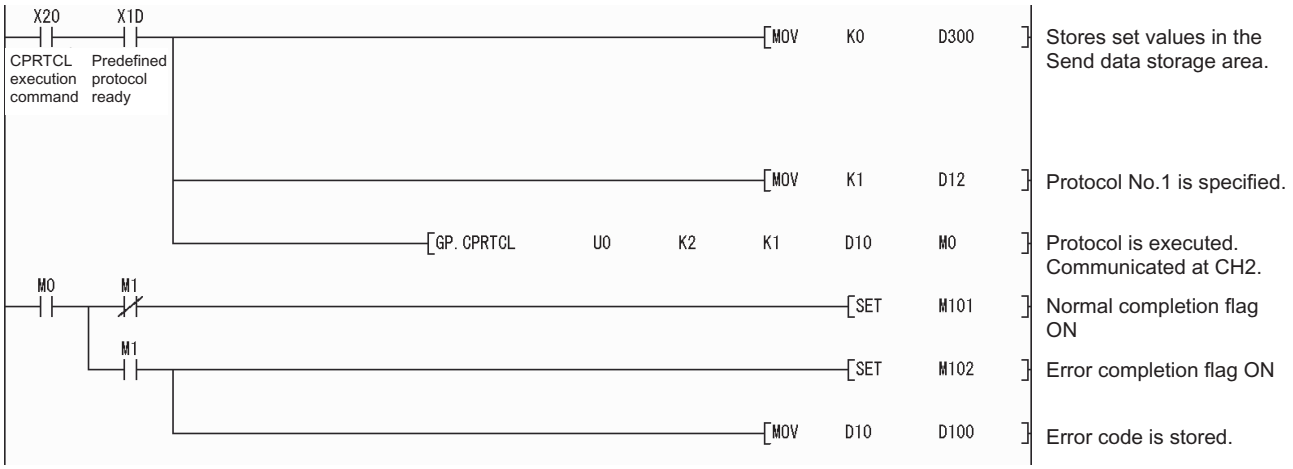


(d) Executing the protocols (program example)
Create a program with the dedicated instruction (CPRTCL instruction) using GX Developer.
Switch the CPU module to RUN, and execute the registered protocol by the dedicated instruction (CPRTCL instruction).
The following table shows the devices to be used.

- I/O signal of QJ71C24N
  Predefined protocol ready: X1D

- Devices used in program example

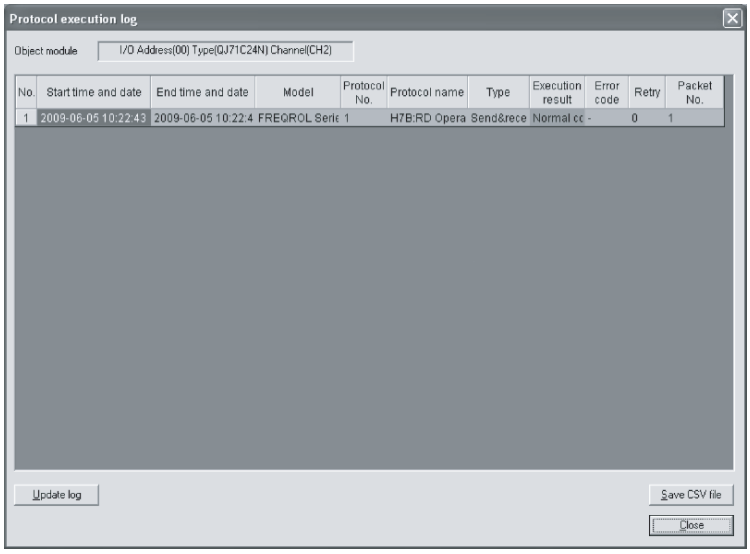
Device	Purpose	Device	Purpose
X20	CPRTCL instruction execution command	M1	Status display device at completion
D300	Inverter Station Number designation device	M101	Normal completion flag
D10	Execution result storing device for the CPRTCL instruction	M102	Error completion flag
D12	Execution protocol number designation device	D100	Error code storing device
M0	Completion device	—	—



Receive data are stored to the receive data storage area (D200 to D203) that is set to the receive packet.

(e) Checking protocol execution result

1) Select [Debugging support function] → [Protocol execution log]. On the "Protocol execution log" screen, the execution result of the protocol can be checked.



Point

The registration conditions of the logs can be specified in Protocol execution log specification (buffer memory address: 40E2H, 40F2H) and can be set on the intelligent function module utility.

The following are registration conditions.

0th bit is off (0): Error logs of failed protocol executions are stored.

0th bit is on (1): Execution states and logs of all protocols are stored.

In the default setting, only error logs of failed protocol executions are displayed. To display all the protocol logs, the setting is required on the intelligent function module utility before executing RUN in the step (3)(d) in this section.

For details, refer to Section 8.1.2, 8.1.4.

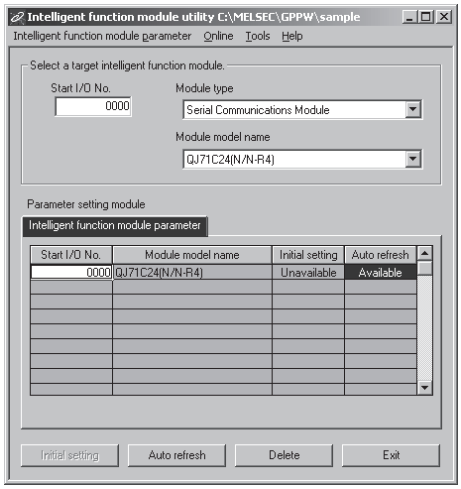
9 UTILITY PACKAGE (GX Configurator-SC)

GX Configurator-SC is a tool that supports the production of necessary sequence programs with initial setting, monitoring and testing, and data communication processing of the Q series C24.
GX Configurator-SC is composed of the following utilities:

- Intelligent function module utility
- Protocol FB support function
- Pre-defined protocol support function

(1) Intelligent function utility (utility package) (see this chapter)

The utility package facilitates the initial settings and monitoring of the Q series C24 by using dedicated screens without having to consider the I/O signals or buffer memory.
The utility package can also be used together with GX Simulator (SWnD5□-LLT-E).



(2) Protocol FB support function

The protocol FB support function automatically generates the FB (function block) for communication that supports data communication processing and traces the network that monitors the data transmitted/received on the communication network.
By using the protocol FB support function, producing sequence programs and transmission debug is made easy.
For use of this function, the non procedure protocol is used.
For details on the protocol FB support function, see the GX Configurator-SC Operating Manual (Protocol FB support function).

(3) Pre-defined protocol support function

The Pre-defined protocol support function is offered for the QJ71C24N(-R2/R4) to use the pre-defined protocol communication.
Protocol settings required for data communication can be configured easily by selecting any options on the protocol selection screen and writing the data to the flash ROM.
Furthermore, the debugging for the pre-defined protocol communication (debug support function) is also available.
The Pre-defined protocol support function can reduce the programming man-hours and the volume of the program that is to be written to a programmable controller CPU.
This function is used with the pre-defined protocol.
For details of the Pre-defined protocol support function, refer to the Operating Manual (Pre-defined protocol support function).

9.1 Functions Available with Utility Package

The following table lists the utility package function.

(○ : indicates that the setting is valid with the applicable protocol.)

Function			MC	Non procedure protocol	Bidirectional protocol	Pre-defined protocol	Explanation page	Remarks
Auto refresh setting		Refresh the Q series C24's error codes and set devices on the programmable controller CPU side.	○	○	○	○	Section 4.6	Can be used via online operation. Can be used via offline operation.
User frame		Register the user frame in the flash ROM.	○	○	—	—	Section 9.4.1	
Data for modem initialization		Register the data for modem initialization in the flash ROM.	○	○	○	—	Section 9.4.2	
Data for modem connection		Register the data for model connection in the flash ROM.	○	○	○	—	Section 9.4.3	
Modem function system setting		Register the system setting values for model function in the flash ROM.	○	○	○	—	Section 9.4.4	
System setting	CHn Transmission control and others system setting	Set the transmission specifications with the other device. (DTR/DSR control, DC code control, communication method, data communication monitoring timer value, etc.)	○	○	○	○	Section 9.4.5	
	CHn MC protocol system setting	Assign the buffer memory for on-demand function, set the user frame number, etc.	○	—	—	—	Section 9.4.6	
	CHn Non procedure system setting	Assign the buffer memory needed to perform data communication using the non procedure protocol, and change the setting values, etc.	—	○	—	—	Section 9.4.7	
	CHn Bidirectional system setting	Assign the buffer memory needed to perform data communication using the bidirectional protocol, and change the setting values, etc.	—	—	○	—	Section 9.4.8	
	CHn Pre-defined protocol system setting	Change the set value for data communication using the pre-defined protocol.	—	—	—	○	Section 9.4.9	
	CHn PLC CPU monitoring system setting	Set the programmable controller CPU monitoring function.	○	○	—	—	Section 9.4.10	
	CHn Transmission user frame No. designation system setting	Set the user frame number to be transmitted, etc.	—	○	—	—	Section 9.4.11	
System setting default		Reset the setting values in the buffer memory to their default values.	○	○	○	○	Section 9.4.12	Can be used only via online operation.
System setting write		Write the setting values in the buffer memory to the flash ROM.	○	○	○	○	Section 9.4.12	
Flash ROM write allow/prohibit designation		Set whether to allow or prohibit writing to the flash ROM.	—	—	—	—	Section 9.4.13	
X/Y monitor/test		Perform the monitoring/testing of I/O signals to/from the programmable controller CPU.	○	○	○	○	Section 9.6.1	
Modem function monitor/test		Monitor the execution status of the modem function.	○	○	○	—	Section 9.6.2	
Monitor	CHn Transmission control and others monitor/test	Monitor the status of interface control signals, values set from the GX Developer, etc.	○	○	○	○	Section 9.6.3	
	CHn MC protocol monitor	Monitor the data communication result, I/O signal status, and setting values in the buffer memory.	○	—	—	—	Section 9.6.4	
	CHn Non procedure monitor/test		—	○	—	—	Section 9.6.5	
	CHn Bidirectional monitor		—	—	○	—	Section 9.6.6	
	CHn Pre-defined protocol monitor/test		—	—	—	○	Section 9.6.7	
	CHn PLC CPU monitoring monitor	Monitor the setting values and operating status of the programmable controller CPU monitoring function.	○	○	—	—	Section 9.6.8	
	CHn User frame No. designation monitor for transmission	Monitor the setting value for user frame to be transmitted.	○	○	—	—	Section 9.6.9	
Monitor/test others		Monitor the data reception result, error occurrence status, etc.	○	○	○	○	Section 9.6.10	
ERR LED off		Turn off the ERR LEDs on the front face of the module.	○	○	○	○	Section 9.6.11	
Non procedure protocol receive data clear		Clear the currently received data.	—	○	—	—	Section 9.7	

9.2 Installing and Uninstalling the Utility Package

For how to install or uninstall the utility package, refer to "Method of installing the MELSOFT Series" included in the utility package.

9.2.1 Handling precautions

The following explains the precautions on using the utility package.

(1) For safety

Since the utility package is add-in software for GX Developer, read "Safety Precautions" and the basic operating procedures in the GX Developer Operating Manual.

(2) About installation

The GX Configurator-SC (utility package) is an add-in package for GX Developer Version 4 or later.
Therefore, GX Configurator-SC must be installed on the personal computer that has already GX Developer Version 4 or later installed.

(3) Screen error of Intelligent function module utility

Insufficient system resource may cause the screen to be displayed inappropriately while using the Intelligent function module utility.
If this occurs, close the Intelligent function module utility, GX Developer (program, comments, etc.), and other applications, and then start Intelligent function module utility again from GX Developer.

(4) To start the intelligent function module utility

(a) In GX Developer, select "QCPU (Q mode)" for PLC series and specify a project.
If any PLC series other than "QCPU (Q mode)" is selected, or if no project is specified, the Intelligent function module utility will not start.

(b) Multiple Intelligent function module utilities can be started.
However, [Open parameters] and [Save parameters] operations under [Intelligent function module parameter] are allowed for one Intelligent function module utility only. Only the [Monitor/test] operation is allowed for the other utilities.

(5) Switching between two or more Intelligent function module utilities

When two or more Intelligent function module utility screens cannot be displayed side by side, select a screen to be displayed on the top of others using the task bar.



(6) Number of parameters that can be set in GX Configurator-SC

When multiple intelligent function modules are mounted, the number of parameter settings must not exceed the following limit.

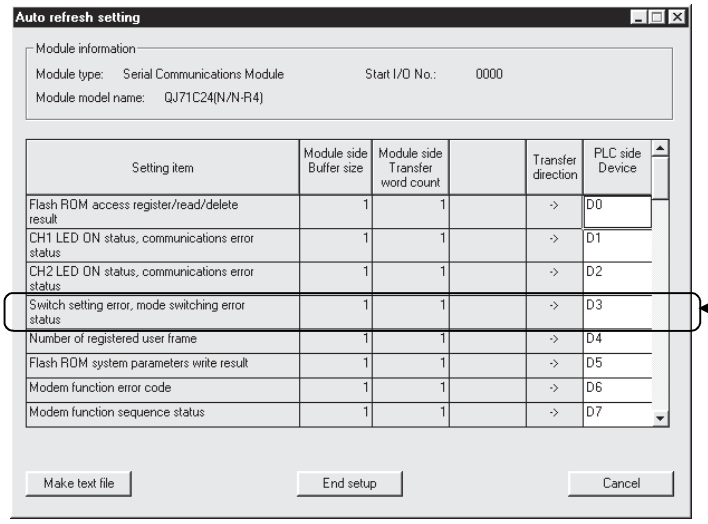
When intelligent function modules are installed to:	Maximum number of parameter settings	
	Initial setting	Auto refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q02PH/Q06PH/Q12PH/Q25PHCPU	512	256
Q12PRH/Q25PRHCPU	512	256
Q00UJ/Q00U/Q01UCPU	512	256
Q02UCPU	2048	1024
Q03UD/Q04UDH/Q06UDH/Q10UDH/ Q13UDH/Q20UDH/Q26UDH/Q03UDE/ Q04UDEH/Q06UDEH/Q10UDEH/ Q13UDEH/Q20UDEH/Q26UDEHCPU	4096	2048
CPU modules other than the above	Not supported	Not supported
MELSECNET/H remote I/O station	512	256

For example, if multiple intelligent function modules are installed to the MELSECNET/H remote I/O station, configure the settings in GX Configurator so that the number of parameter settings for all the intelligent function modules does not exceed the limit of the MELSECNET/H remote I/O station. Calculate the total number of parameter settings separately for the initial setting and for the auto refresh setting.

The number of parameters that can be set for one module in GX Configurator-SC is as listed below.

Target Module	Initial setting	Auto refresh setting
QJ71C24N	0 (Not used)	48 (Max.)
QJ71C24N-R2	0 (Not used)	49 (Max.)
QJ71C24N-R4	0 (Not used)	48 (Max.)
QJ71C24	0 (Not used)	48 (Max.)
QJ71C24-R2	0 (Not used)	49 (Max.)

Example) Counting the number of parameter settings in Auto refresh setting


Auto refresh setting
Module information
Module type: Serial Communications Module
Start I/O No.: 0000
Module model name: QJ71C24(N/N-R4)
Setting item
Module side Buffer size
Module side Transfer word count
Transfer direction
PLC side Device
Flash ROM access register/read/delete result 1 1 -> D0
CH1 LED ON status, communications error status 1 1 -> D1
CH2 LED ON status, communications error status 1 1 -> D2
Switch setting error, mode switching error status 1 1 -> D3
Number of registered user frame 1 1 -> D4
Flash ROM system parameters write result 1 1 -> D5
Modem function error code 1 1 -> D6
Modem function sequence status 1 1 -> D7
Make text file
End setup
Cancel

This one row is counted as one setting.
Blank rows are not counted.
Count up all the setting items on this screen, and add the total to the number of settings for other intelligent function modules to get a grand total.

9.2.2 Operating environment

This section describes the operating environment of the personal computer that runs GX Configurator-SC.

Item		Description
Installation (add-in) target *1		GX Developer Version 4 (English version) or later *2 *4
Personal computer		Personal computer running one of the following operating systems
	CPU	Refer to the next page "Operating system and performance required for a personal computer".
	Required memory	
Available hard disk capacity	For installation	65MB or more
	For operation	20MB or more
Monitor		Resolution 800 × 600 pixels or higher *3
Operating system		Microsoft® Windows® 95 Operating System (English version) Microsoft® Windows® 98 Operating System (English version) Microsoft® Windows® Millennium Edition Operating System (English version) Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version) Microsoft® Windows® 2000 Professional Operating System (English version) Microsoft® Windows® XP Professional Operating System (English version) Microsoft® Windows® XP Home Edition Operating System (English version) Microsoft® Windows Vista® Home Basic Operating System (English version) Microsoft® Windows Vista® Home Premium Operating System (English version) Microsoft® Windows Vista® Business Operating System (English version) Microsoft® Windows Vista® Ultimate Operating System (English version) Microsoft® Windows Vista® Enterprise Operating System (English version) Microsoft® Windows® 7 Starter Operating System (English version) *4 Microsoft® Windows® 7 Home Premium Operating System (English version) *4 Microsoft® Windows® 7 Professional Operating System (English version) *4 Microsoft® Windows® 7 Ultimate Operating System (English version) *4 Microsoft® Windows® 7 Enterprise Operating System (English version) *4

*1: Install GX Configurator-SC in GX Developer Version 4 or later in the same language.
GX Developer (English version) and GX Configurator-SC (Japanese version) or GX Developer (Japanese version) and GX Configurator-SC (English version) cannot be used in combination.

*2: GX Configurator-SC is not applicable to GX Developer Version 3 or earlier.
Install GX Configurator-SC (Pre-defined protocol support function) as an add-in to GX Developer Version 8.78G or later.

*3: The recommended resolution is 1024 × 768 pixels or higher for Windows Vista® and Windows® 7.

*4: For 32-bit Windows® 7, install GX Configurator-SC Version 2.21X or later as an add-in to GX Developer Version 8.91V or later.
For 64-bit Windows® 7, install GX Configurator-SC Version 2.21X or later as an add-in to GX Developer Version 8.98C or later.

Operating system and performance required for a personal computer

Operating system	Performance required for a personal computer	
	CPU	Memory
Windows® 95 (Service Pack 1 or later)	Pentium® 133MHz or more	32MB or more
Windows® 98	Pentium® 133MHz or more	32MB or more
Windows® Me	Pentium® 150MHz or more	32MB or more
Windows NT® Workstation 4.0 (Service Pack 3 or later)	Pentium® 133MHz or more	32MB or more
Windows® 2000 Professional	Pentium® 133MHz or more	64MB or more
Windows® XP	Pentium® 300MHz or more	128MB or more
Windows Vista®	Pentium® 1GHz or more	1GB or more
Windows® 7	Pentium® 1GHz or more	1GB or more (32-bit version) 2GB or more (64-bit version)

POINT

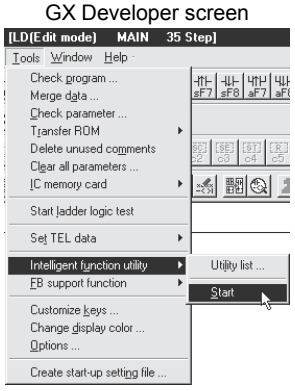
- The following functions cannot be used when the computer is running under Windows® XP, Windows Vista® , or Windows® 7. This product may not perform properly, when these functions are used.
  - Activating the application with Windows® compatible mode
  - Simplified user switch-over
  - Remote desktop
  - Large font size (Advanced setting of Display Properties)
  - DPI setting other than 100%
  - 64-bit version *1
  - Windows XP Mode
  - Windows Touch

  *1: Supported by Windows® 7.
- Use the product as a user having a privilege higher than "USER" for Microsoft® Windows Vista® .

9.3 Utility Package Operation

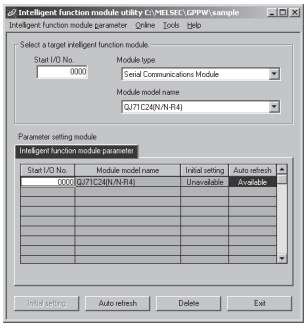
9.3.1 Operation overview

GX Developer screen



[Tools] – [Intelligent function utility] – [Start]

Select a target intelligent function module screen



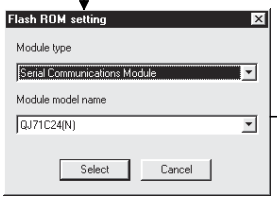
See Section 9.3.2

When used via online operation → 1) Go to next page

When auto refresh is set → 2) Go to next page

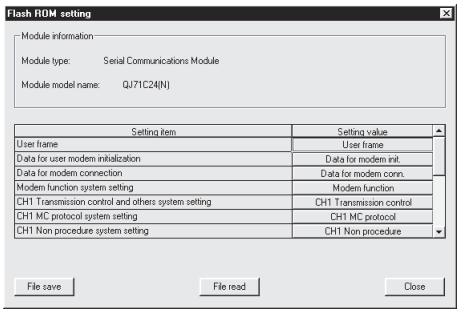
When used via offline operation

Select [Tools] – [Flash ROM setting] from the menu bar.



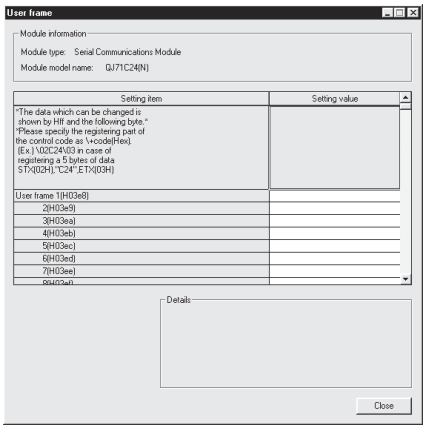
Select the module type and module model name.

Flash ROM settings screen



See Section 9.4

To each setting screen



See Sections 9.4.1 to 9.4.11

POINT

The following settings must be performed before starting the intelligent function module utility:

- Set the project using GX Developer
- Set "QCPU (Q mode)" for the PC series.

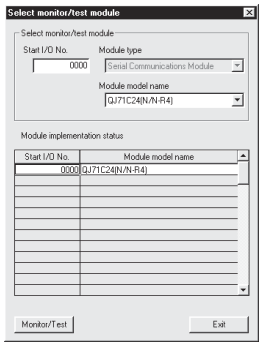
POINT

The various setting values to be registered in the Q series C24's flash ROM can be saved in a file of the personal computer via offline operation.
Use online operation to write system setting values to the Q series C24.

1) When using online operation

Select [Online] – [Monitor/Test] from the menu bar.

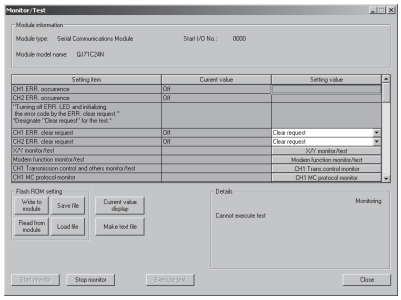
Select monitor/test module screen



Monitor/Test

Select a module to be monitored/tested.

Monitor/Test screen



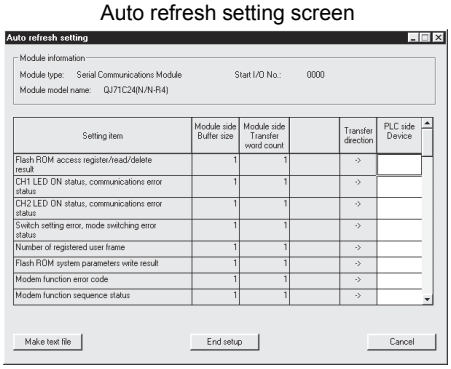
See Section 9.4
See Section 9.6

2) When setting auto refresh

Auto refresh

Enter "Start I/O No.", and select "Module type" and "Module model name".

Auto refresh setting screen


Auto refresh setting
Module information
Module type: Serial Communications Module
Start I/O No.: 0000
Module model name: QJ71C24(N/N-R4)
Setting item
Module side Buffer size
Module side Transfer word count
Transfer direction
PLC side Device
Flash ROM access register/read/delete result
CH1 LED ON status, communications error status
CH2 LED ON status, communications error status
Switch setting error, mode switching error status
Number of registered user frame
Flash ROM system parameters write result
Modem function error code
Modem function sequence status
Make text file
End setup
Cancel

See Screen 4.6

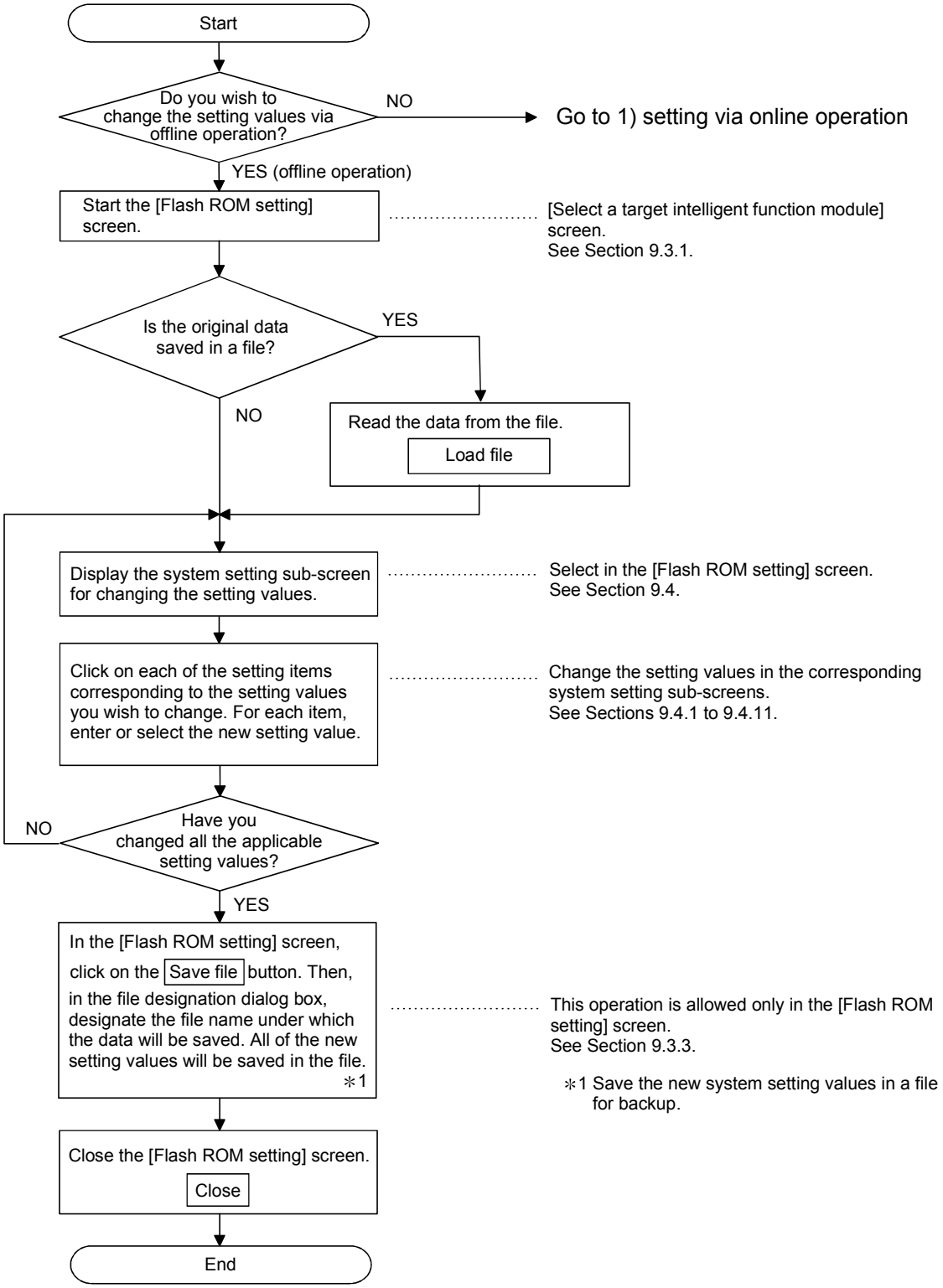
POINT

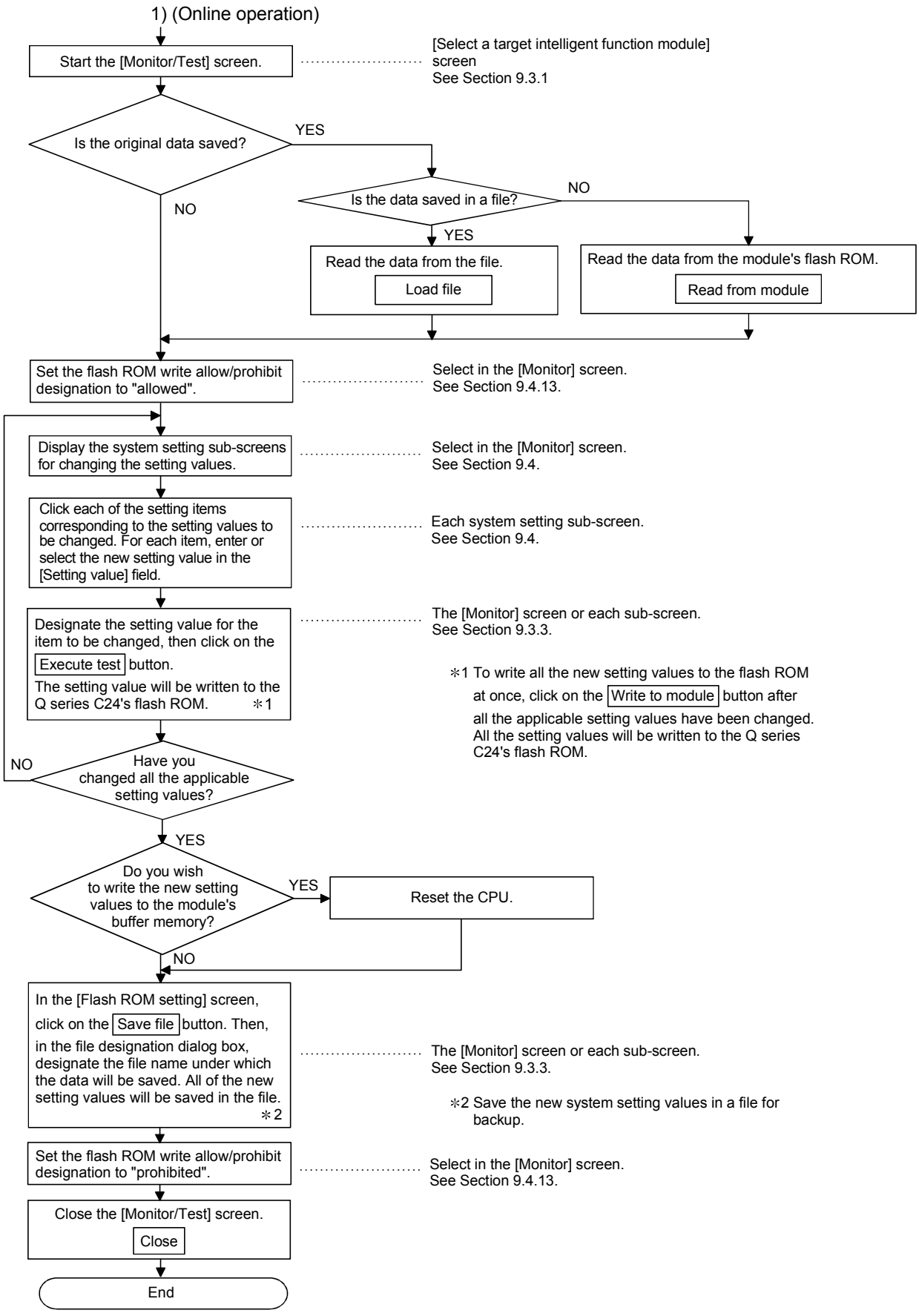
(1) When the setting operation is complete in each system setting screen, register the system setting data in the flash ROM, then restart the programmable controller CPU to resume data transmission.

(2) With the Q series C24, monitoring, testing, and reading/writing of setting values can be performed via online operation.

REMARKS

The following diagram illustrates the overview of a procedure in which GX Configurator-SC is used to change the system setting values of the Q series C24 and save the new values to a file or write them to the Q series C24's flash ROM.


Start
Do you wish to change the setting values via offline operation?
NO
Go to 1) setting via online operation
YES (offline operation)
Start the [Flash ROM setting] screen.
[Select a target intelligent function module] screen.
See Section 9.3.1.
Is the original data saved in a file?
YES
NO
Read the data from the file.
Load file
Display the system setting sub-screen for changing the setting values.
Select in the [Flash ROM setting] screen.
See Section 9.4.
Click on each of the setting items corresponding to the setting values you wish to change. For each item, enter or select the new setting value.
Change the setting values in the corresponding system setting sub-screens.
See Sections 9.4.1 to 9.4.11.
Have you changed all the applicable setting values?
NO
YES
In the [Flash ROM setting] screen, click on the Save file button. Then, in the file designation dialog box, designate the file name under which the data will be saved. All of the new setting values will be saved in the file. *1
This operation is allowed only in the [Flash ROM setting] screen.
See Section 9.3.3.
*1 Save the new system setting values in a file for backup.
Close the [Flash ROM setting] screen.
Close
End

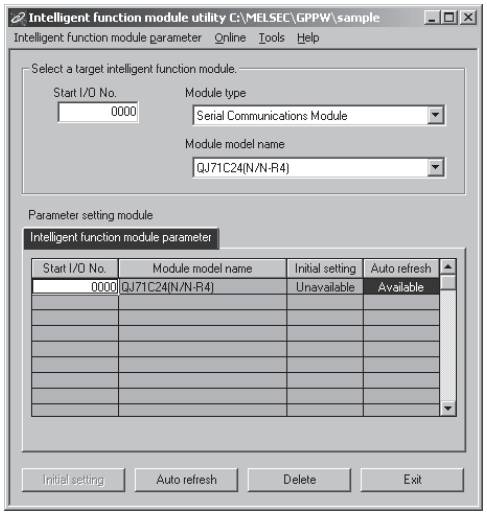

1) (Online operation)
Start the [Monitor/Test] screen.
[Select a target intelligent function module] screen
See Section 9.3.1
Is the original data saved?
YES
NO
Is the data saved in a file?
NO
YES
Read the data from the file.
Load file
Read the data from the module's flash ROM.
Read from module
Set the flash ROM write allow/prohibit designation to "allowed".
Select in the [Monitor] screen.
See Section 9.4.13.
Display the system setting sub-screens for changing the setting values.
Select in the [Monitor] screen.
See Section 9.4.
Click each of the setting items corresponding to the setting values to be changed. For each item, enter or select the new setting value in the [Setting value] field.
Each system setting sub-screen.
See Section 9.4.
Designate the setting value for the item to be changed, then click on the Execute test button.
The setting value will be written to the Q series C24's flash ROM. *1
The [Monitor] screen or each sub-screen.
See Section 9.3.3.
*1 To write all the new setting values to the flash ROM at once, click on the Write to module button after all the applicable setting values have been changed. All the setting values will be written to the Q series C24's flash ROM.
NO
Have you changed all the applicable setting values?
YES
Do you wish to write the new setting values to the module's buffer memory?
YES
Reset the CPU.
NO
In the [Flash ROM setting] screen, click on the Save file button. Then, in the file designation dialog box, designate the file name under which the data will be saved. All of the new setting values will be saved in the file. *2
The [Monitor] screen or each sub-screen.
See Section 9.3.3.
*2 Save the new system setting values in a file for backup.
Set the flash ROM write allow/prohibit designation to "prohibited".
Select in the [Monitor] screen.
See Section 9.4.13.
Close the [Monitor/Test] screen.
Close
End

9.3.2 Starting the Intelligent function module utility

[Operating procedure]

Intelligent function module utility is started from GX Developer.
[Tools] → [Intelligent function utility] → [Start]

[Setting screen]



[Explanation of items]

(1) Activation of other screens

The following screens can be displayed from the intelligent function module utility screen.

(a) Flash ROM setting screen
[Tools] → [Flash ROM setting] → "Module type" → "Module model Name" → Select

(b) Auto refresh setting screen
"Start I/O No. *1" → "Module type" → "Module model name" → Auto refresh

(c) Select monitor/test module screen
[Online] → [Monitor/Test]

*1 Enter the start I/O No. in hexadecimal.

(2) Command buttons

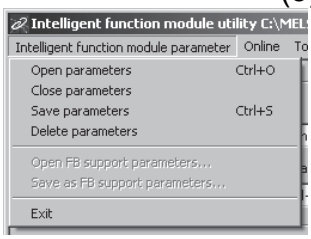
Initial setting : Cannot be selected.

Auto refresh : Starts the auto refresh setting screen.

Delete : Deletes the initial setting and auto refresh setting of the selected module.

Exit : Close this screen.

(3) Menu bar



(a) File menu

Intelligent function module parameters of the project opened by GX Developer are handled.

[Open parameters] : Reads a parameter file.

[Close parameters] : Closes the parameter file. If any data are modified, a dialog asking for file saving will appear.

[Save parameters] : Saves the parameter file.

[Delete parameters] : Deletes the parameter file.

[Exit] : Close this screen.

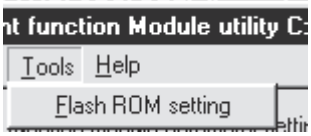


(b) Online menu

[Monitor/Test] : Activates the Select monitor/test module screen.

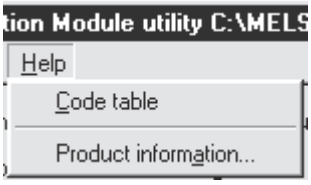
[Read from PLC] : Reads intelligent function module parameters from the CPU module.

[Write to PLC] : Writes intelligent function module parameters to the CPU module.



(c) Tool items

[Flash ROM setting] : Starts the flash ROM setting screen.



(d) Help items

[Code table] : Displays the ASCII code list. Use this list as reference when setting data.

[Product information] : Displays the version information of the intelligent function module utility.

POINT

(1) Saving intelligent function module parameters in a file

Since files cannot be saved using the GX Developer project saving operation, save the files using the "Select a target intelligent function module" screen shown above.

(2) Reading/writing intelligent function module parameters from/to a programmable controller using GX Developer

(a) Intelligent function module parameters can be read from and written into a programmable controller after having been saved in a file.

(b) Set a target programmable controller CPU in GX Developer:
[Online] → [Transfer setup].
Perform Write to PLC for the intelligent function module parameters in a multiple CPU system only to the control CPU of the Q series C24.

(c) Use GX Developer to perform Read from PLC/Write to PLC operations for the intelligent function module parameters at the remote I/O station.
GX Configurator-SC can not be used.

(3) Checking the required utility

While the start I/O is displayed on the Intelligent function module utility setting screen, "∗" may be displayed for the model name.
This means that the required utility has not been installed or the utility cannot be started from GX Developer.
Check the required utility, selecting [Tools] - [Intelligent function utility] - [Utility list...] in GX Developer.

9.3.3 Common utility package operations

This section explains how to perform the common operations in the data setting, auto refresh setting and monitor/test screens.

(1) Control keys

Special keys that can be used for operation of the utility package and their applications are listed in the table below.

Key	Application
Esc	Cancels the current entry in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Used in combination with the mouse operation to select multiple cells for test execution.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents in the cell.
Back space	Deletes the character where the cursor is positioned.
↑ ↓ ← →	Moves the cursor.
Page up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
Enter	Completes the entry in the cell.

(2) Operation Command Buttons

Current value display : Displays the current value of the item selected.

Make text file : Creates a file containing the screen data in text file format.

Start monitor : Starts monitoring of the current value field.

Stop monitor : Stops monitoring of the current value field.

Execute test : Registers the system setting data of the selected item in the flash ROM. ＊1

To apply Execute test to multiple items simultaneously, set the data for the corresponding items, select the multiple items while pressing down Ctrl, then click Execute test.

＊1 The settings for "receive data clear request" and "flash ROM write allow/prohibit designation" are written to the buffer memory.

Write to module : Registers all system setting data for the Q series C24 in the flash ROM.

Read from module : Reads all system setting data for the Q series C24 from the flash ROM.

Save file : Saves all system setting data for the Q series C24 to the designated file (extension: UMD).

Load file : Reads all system setting data for the Q series C24 from the designated file (extension: UMD).

Close : Closes the screen that is currently open and returns to the previous screen.

End setup : Saves/writes the system setting data, closes the current screen, and returns to the previously displayed screen.

* With offline operation, only [Save file] and [Load file] are enabled.

POINT

(1) When the setting operation is complete in each system setting screen, register the system setting data in the flash ROM, then restart the programmable controller CPU to resume data transmission.

(2) If two or more intelligent function module utility packages are running, perform each operation after selecting the target utility package from the task bar and making it active.

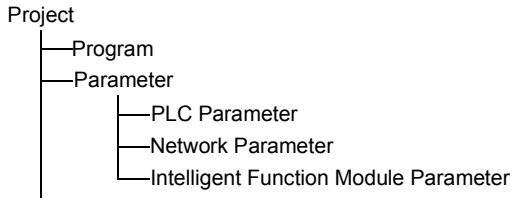
(3) When the menu screen for system registration to flash ROM (see Section 9.4) is closed, all the system setting data will be cleared. Before closing the screen, write the data to the module (enabled only via online operation) or save it to a file.

(3) Data/file to be created with utility package

The following data or files that are created with the utility package can be also handled in GX Developer. Figure 9.1 shows respective data or files are handled in which operation.

<Intelligent function module parameter>

(a) This represents the data created in Auto refresh setting, and they are stored in an intelligent function module parameter file in a project created by GX Developer.



(b) Steps 1) to 3) shown in Figure 9.1 are performed as follows:

1) From GX Developer, select:
[Project] → [Open project] / [Save] / [Save as]

2) On the intelligent function module selection screen of the utility, select:
[Intelligent function module parameter] → [Open parameters] / [Save parameters]

3) From GX Developer, select:
[Online] → [Read from PLC] / [Write to PLC] → "Intelligent function module parameters"
Alternatively, from the intelligent function module selection screen of the utility, select:
[Online] → [Read from PLC] / [Write to PLC]

<Flash ROM data>

(a) This means the data set in Flash ROM setting and they can be stored in any directory separately from projects of GX Developer.

(b) Steps 4) and 5) in Figure 9.1 are performed as follows:

4) This operation can be executed from the [Flash ROM setting] screen or [Monitor/Test] screen of the utility.
[Flash ROM setting] screen → [Load file]/[Save file]
[Monitor/Test] screen → [Load file]/[Save file]

5) This operation can be executed from the [Monitor/Test] screen of the utility.
[Monitor/Test] screen → [Read from module]/[Write to module]

<Make text file>

(a) Clicking Make text file on the Auto refresh setting or Monitor/Test screen creates a text file.
This feature is useful for documentation of users.

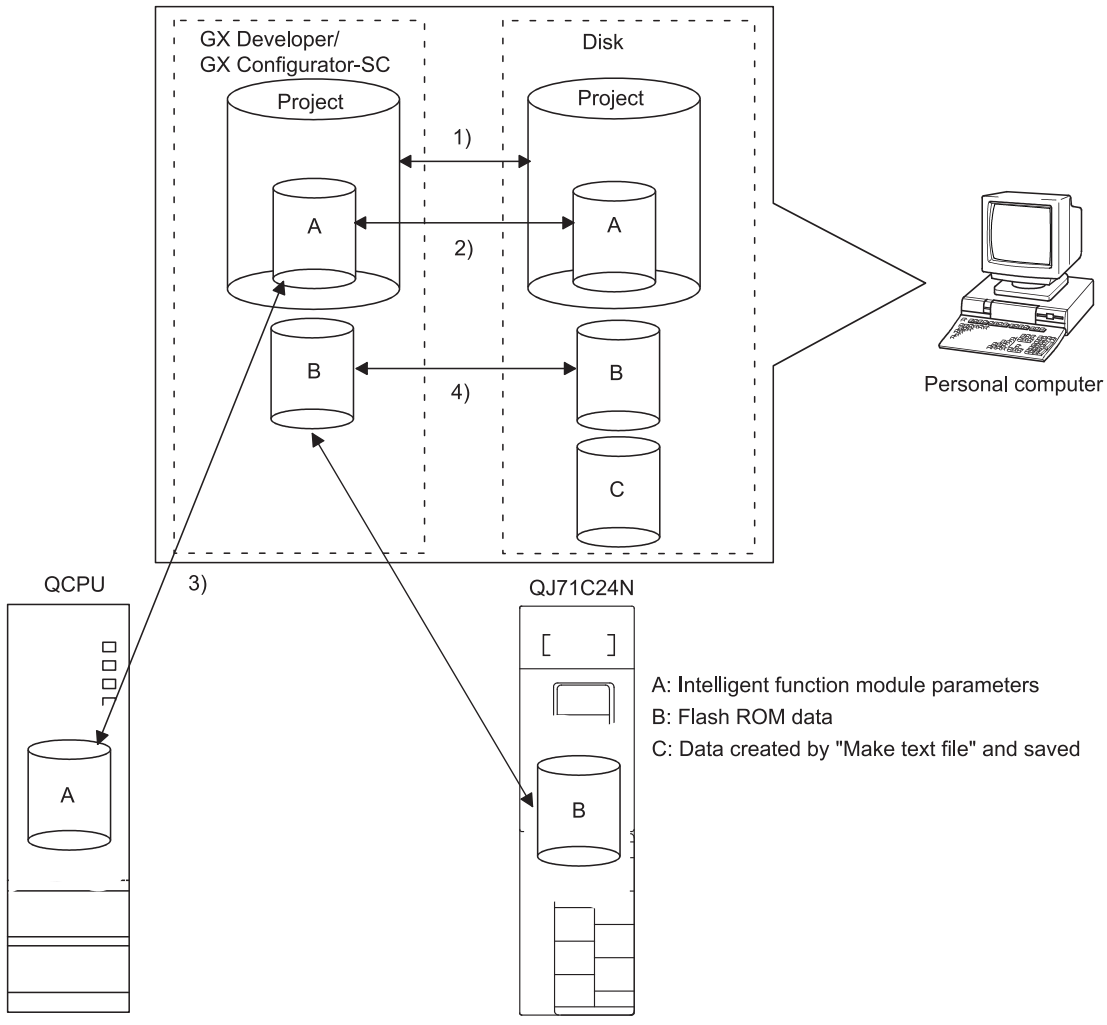


Figure 9.1 Correlation chart for data created with the utility package

9.4 System Registration to Flash ROM

[Purpose]

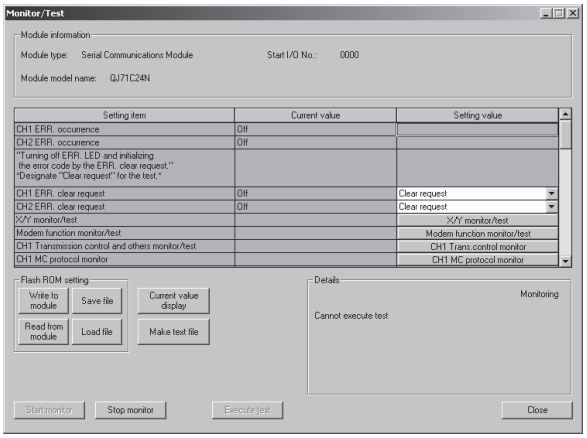
Display the menu screen for flash ROM registration, which is used to change the initial values set in the Q series C24's buffer memory.

[Operating procedure]

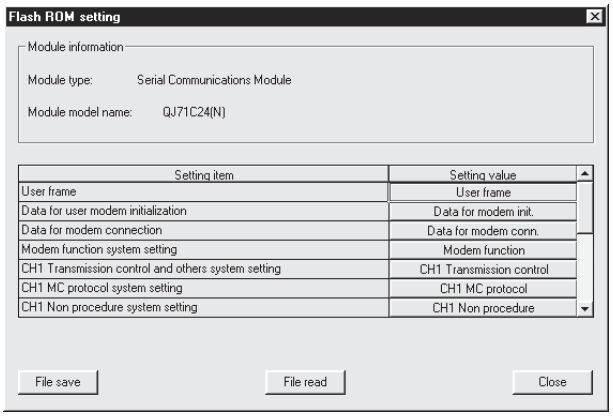
- Online operation
  - ∗ Startup from Intelligent function module utility
    (GX Developer Version 4 or later)
    [Online] → [Monitor/Test] → "Select monitor/test module" →
    Monitor/Test → [Monitor] screen
  - ∗ Startup from the system monitor (GX Developer Version 6 or later).
    [GX Developer] → [Diagnostics] → [System Monitor] → "Select the Q series C24 by installation status" → Diagnostics... → [Monitor] screen
- Offline operation
  [Tools] → Flash ROM setting → [Flash ROM setting] screen

[Setting screen]

Screen displayed during online operation (∗1)



Screen displayed during offline operation



∗1 The selection menus for system setting/registration are displayed by scrolling on the [Monitor] screen during online operation.
The selection buttons pertaining to flash ROM registration are displayed in blue on the screen.

[Setting Items]

The following table lists the selection menus for system setting/registration to be displayed:

Function	Section	Remarks
User frame registration	Section 9.4.1	Can be used via online operation. Can be used via offline operation.
Data for modem initialization registration	Section 9.4.2	
Data for modem connection registration	Section 9.4.3	
Modem function system setting	Section 9.4.4	
Transmission control and others system setting	Section 9.4.5	
MC protocol system setting	Section 9.4.6	
Non procedure system setting	Section 9.4.7	
Bidirectional system setting	Section 9.4.8	
Pre-defined protocol system setting	Section 9.4.9	
PLC CPU monitoring system setting	Section 9.4.10	
Transmission user frame No. designation system setting	Section 9.4.11	
Resetting buffer memory/flash ROM setting values to default values	Section 9.4.12	Can be used only via online operation.
Flash ROM write allow/prohibit setting	Section 9.4.13	

POINT

(1) The ASCII codes are listed in Appendix 4 and GX Configurator-SC's Help function. Use the list as a reference.

(2) The values set in the respective setting screens explained in Section 9.4 can be written to the Q series C24 module (via online operation only) or saved to a file.

(3) Perform the following operations in advance to enable the registration of setting values in the flash ROM:
   (a) Switch setting using the GX Developer (see Section 4.5.2)
   Set "Setting change" under [Transmission settings] to "Enable" for both the CH1 and CH2 sides.
   (b) Setting using GX Configurator-SC (see Section 9.4.13)
   Set the flash ROM write allow/prohibit setting to "Allowed".

(4) When a multiple CPU system is employed, GX Configurator-SC should be connected to the control CPU of the Q series C24, and the system setting data register in the flash ROM.
   It is not possible to set target PLC to multiple CPU setting of "Transfer setup" of GX Developer and register the system setting data in the flash ROM.

9.4.1 User frame registration

[Purpose]

Register the user frame used in the following functions:

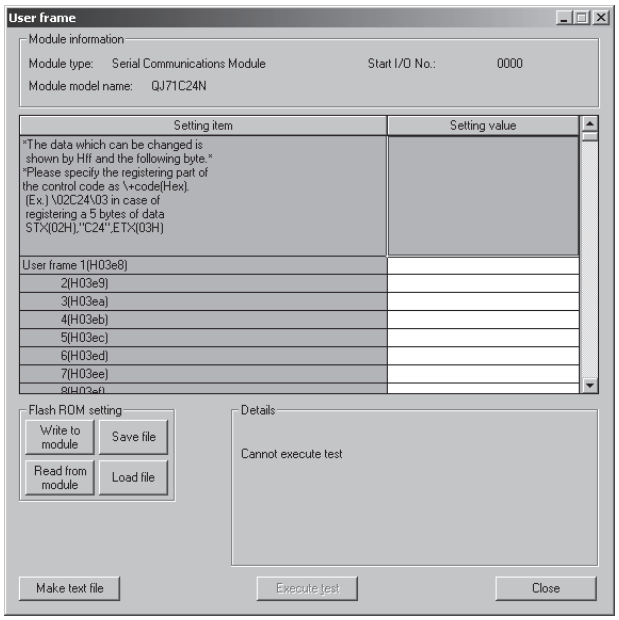
- On-demand function using the MC protocol.
- Data transmission/receive function using the non procedure protocol.

[Operating procedure]

- Online operation
  [Monitor] screen → User frame

- Offline operation
  [Flash ROM setting] screen → User frame

[Setting screen]



[Setting item]

Item	Buffer memory address		Reference section
User frame 1 to 200	CH1	CH2	User's Manual (Application)
	—		

REMARKS

Use \ + code to specify hexadecimal numbers in the control code registration field if QSCU is used for registering a user frame.

(Example) To register the 5 bytes of data, STX (02H), "C24," and ETX (03H), specify the following:
\02C24\03

9.4.2 Data for modem initialization registration

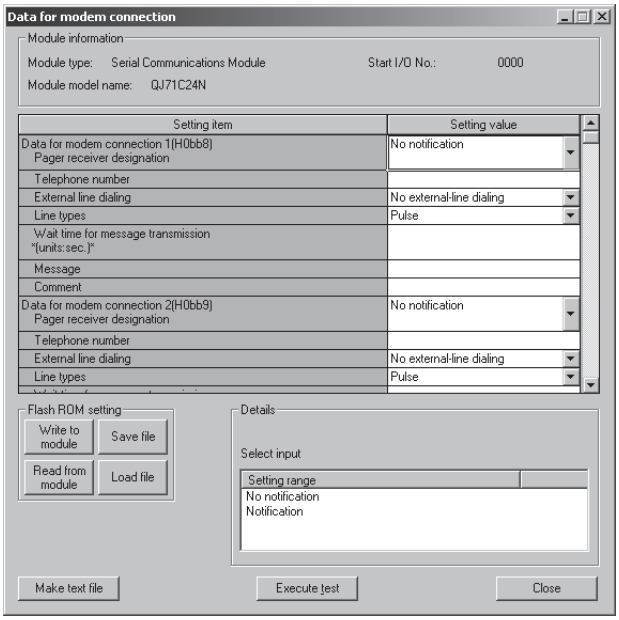
[Purpose]

Register the data for initializing the modem connected to the Q series C24.

[Operating procedure]

- Online operation
  [Monitor] screen → Data for user modem initialization
- Offline operation
  [Flash ROM setting] screen → Data for user modem initialization

[Setting screen]



[Setting item]

Item		Buffer memory address		Reference section
		CH1	CH2	
Data for user initialization 1 to 30	User control data Initialization command	—		User's Manual (Application)

REMARKS

Use \\ code to specify a field to register "\" if GX Configurator-SC is used for data for modem initialization.
(Example) To register the \Q2 of data: \\Q2

9.4.3 Data for modem connection registration

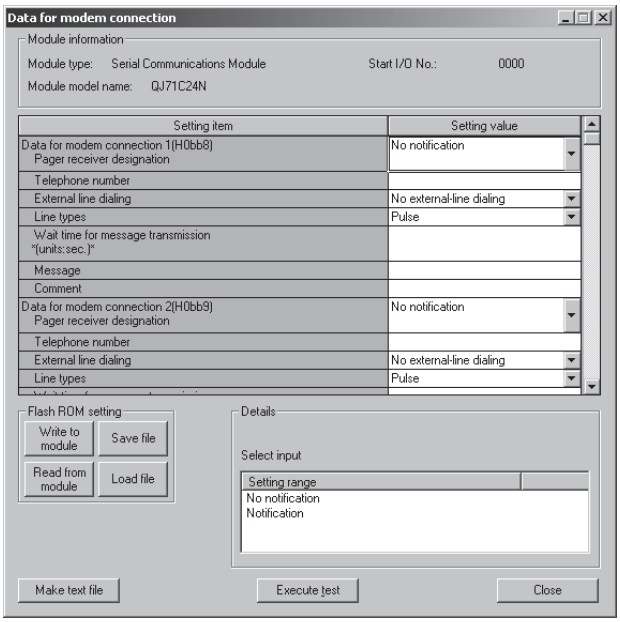
[Purpose]

For data communication and notification using the modem function, register the data for connection with external devices.

[Operating procedure]

- Online operation
  [Monitor] screen → Data for modem connection
- Offline operation
  [Flash ROM setting] screen → Data for modem connection

[Setting screen]



[Setting items]

Item		Buffer memory address		Reference section
		CH1	CH2	
Data for modem connection 1 to 30	Pager receiver designation	—		User's Manual (Application)
	Telephone number			
	External line dialing			
	Line types			
	Wait time for message transmission (units: s)			
	Message			
	Comment			

9.4.4 Modem function system setting/registration

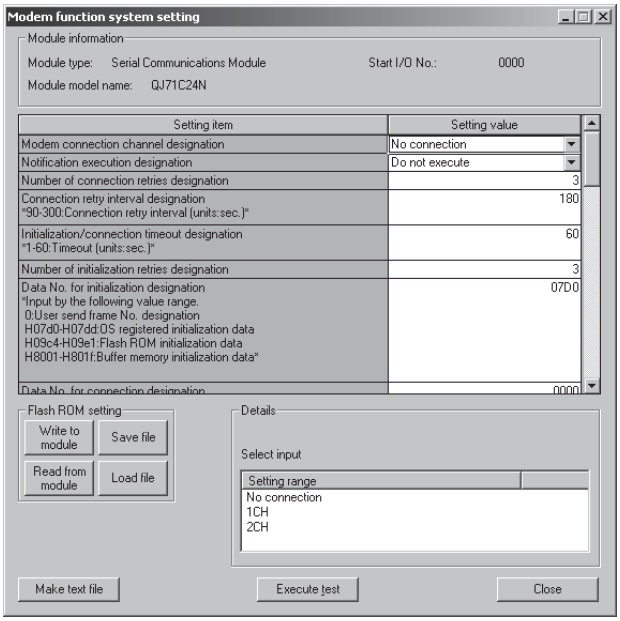
[Purpose]

For data communication using the modem function, register system setting values.

[Operating procedure]

- Online operation
  [Monitor] screen → Modem function system setting
- Offline operation
  [Flash ROM setting] screen → Modem function system setting

[Setting screen]



[Setting items]

Item	Buffer memory address		Reference section
	CH1	CH2	
Modem connection channel designation	2EH		User's Manual (Application)
Notification execution designation	2FH		
Number of connection retries designation	30H		
Connection retry interval designation (units: s)	31H		
Initialization/connection timeout designation (units: s)	32H		
Number of initialization retries designation	33H		
Data No. for initialization designation	34H		
Data No. for connection designation	35H		
GX Developer connection designation	36H		
No-communication interval time designation (units: min)	37H		
RS / CS control yes/no designation	38H		
Modem initialization time DR signal valid/invalid designation	2008H		
Wait time of notification (units: s)	200AH		
Circuit disconnect wait time (PLC CPU watch use) (units: s)	200EH		
Remote password mismatch notification count designation	200CH		
Remote password mismatch notification accumulated count designation	200DH		
Auto modem initialization designation	2007H		
Callback function designation	2001H		
Callback denial notification accumulated count designation	2002H		
Data No. for callback designation 1 to 10	2101H to 210AH		

9.4.5 Transmission control and others system setting

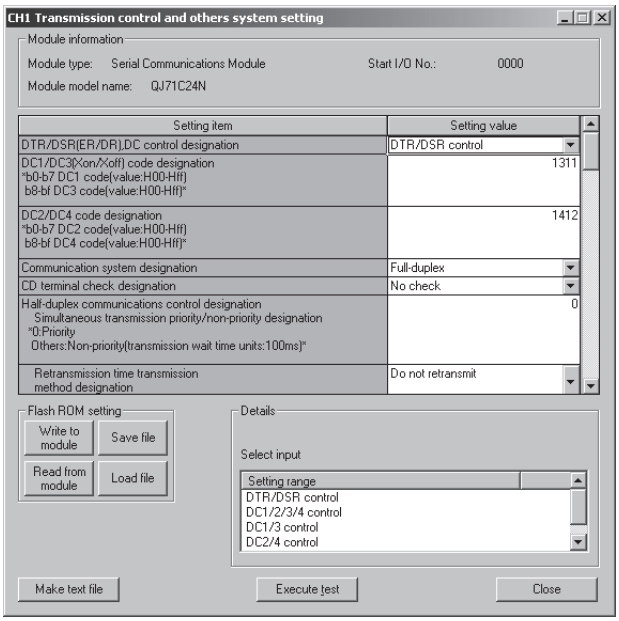
[Purpose]

For data communication with external devices, register system setting values for the transmission control method, monitoring time, and buffer memory assignment.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ Transmission control system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ Transmission control system setting

[Setting screen]



[Setting items]

Item	Buffer memory address		Reference section
	CH1	CH2	
DTR/DSR (ER/DR), DC control designation	93H	133H	User's Manual (Application)
DC1/DC3 (Xon/Xoff) code designation	94H	134H	
DC2/DC4 code designation	95H	135H	
Communication system designation	98H	138H	Section 3.2
CD terminal check designation	97H	137H	
Half-duplex communications control designation Simultaneous transmission priority/non-priority designation	99H	139H	User's Manual (Application)
Half-duplex communications control designation Retransmission time transmission method designation	9AH	13AH	
No-reception monitoring time (timer 0) designation	9CH	13CH	User's Manual (Application)
Response monitoring time (timer 1) designation	9DH	13DH	
Transmission monitoring time (timer 2) designation	9EH	13EH	
Word/byte units designation	96H	136H	User's Manual (Application)
RTS (RS) designation	92H	132H	Section 3.2.1
DTR (ER) designation			
Transmission control start free area	2012H	2112H	User's Manual (Application)
Transmission control end free area	2013H	2113H	
Send/Recv data monitoring designation	2018H	2118H	User's Manual (Application)
Action for buffer full	2019H	2119H	
Stop by Timer 0 error	2019H	2119H	
Monitor buffer head address	201AH	211AH	
Monitor buffer size	201BH	211BH	
Transmission buffer memory head address designation	A2H	142H	Chapters 6 and 7
Transmission buffer memory length designation	A3H	143H	
Receive buffer memory head address designation	A6H	146H	
Receive buffer memory length designation	A7H	147H	
Transmission transparent code designation 1st	11FH	1BFH	User's Manual (Application)
Transmission transparent code designation 2nd to 10th	2030H to 2038H	2130H to 2138H	
Receive transparent code designation	120H	1C0H	
ASCII-BIN conversion designation	121H	1C1H	User's Manual (Application)
Receive interrupt-issued designation	2010H	2110H	User's Manual (Application)
Echo back enable/disable setting(for RS-422/485 I/F)	—	1C2H	Section 3.3.4

9.4.6 MC protocol system setting

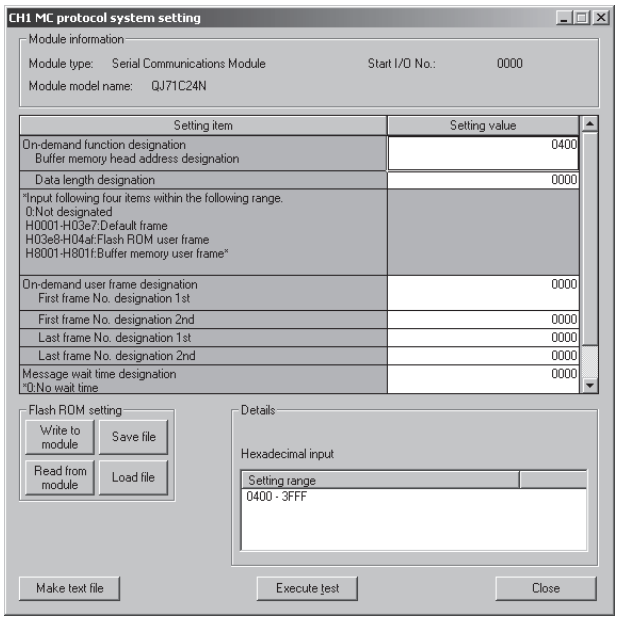
[Purpose]

For data transmission using the MC protocol, register system setting values.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ MC protocol system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ MC protocol system setting

[Setting screen]



[Setting items]

Item		Buffer memory address		Reference section
		CH1	CH2	
On-demand function designation	Buffer memory head address designation	A0H	140H	User's Manual (Application)
	Data length designation	A1H	141H	
On-demand user frame designation	First frame No. designation 1st	A9H	149H	
	First frame No. designation 2nd	AAH	14AH	
	Last frame No. designation 1st	ABH	14BH	
	Last frame No. designation 2nd	ACH	14CH	
Message wait time designation (units: 10 ms)		11EH	1BEH	

9.4.7 Non procedure system setting

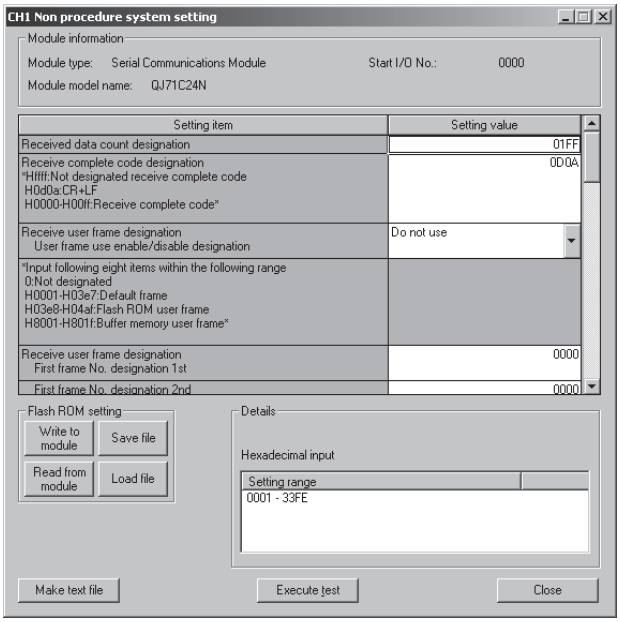
[Purpose]

For data transmission using the non procedure protocol, register system setting values.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ Non procedure system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ Non procedure system setting

[Setting screen]



[Setting items]

Item		Buffer memory address		Reference section
		CH1	CH2	
Received data count designation		A4H	144H	Chapter 6
Receive complete code designation		A5H	145H	
Receive user frame designation	User frame use enable/disable designation	ADH	14DH	User's Manual (Application)
	First frame No. designation 1st to 4th	AEH to B1H	14EH to 151H	
	Last frame No. designation 1st to 4th	B2H to B5H	152H to 155H	
	User frame receive format designation 1st to 4th	2020H to 2023H	2120H to 2123H	
	Exclusive format-1 received data count 1st to 4th	2024H to 2027H	2124H to 2127H	
Transmission user frame designation	CR/LF output designation	B7H	157H	
	Output head pointer designation	B8H	158H	
	Output count designation	B9H	159H	
Timeout at No-protocol		2014H	2114H	User's Manual (Application)

9.4.8 Bidirectional system setting

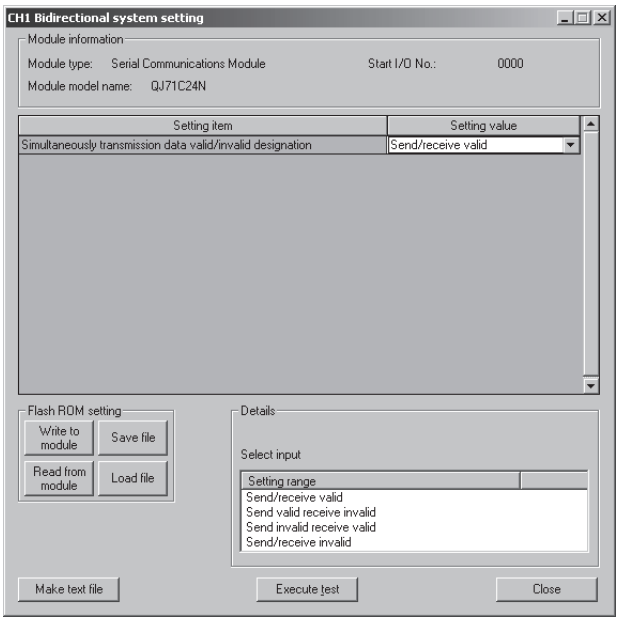
[Purpose]

For data transmission using the bidirectional protocol, register system setting values.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ Bidirectional system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ Bidirectional system setting

[Setting screen]



[Setting item]

Item	Buffer memory address		Reference section
	CH1	CH2	
Simultaneously transmission data valid/invalid designation	9BH	13BH	Section 7.3

9.4.9 Pre-defined protocol system setting

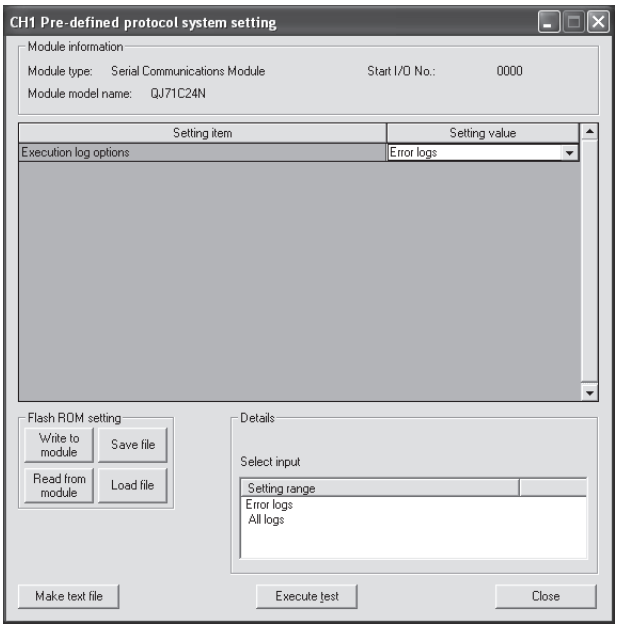
[Purpose]

For data communication using the pre-defined protocol, register system setting values.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ Pre-defined protocol system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ Pre-defined protocol system setting

[Setting screen]



[Setting item]

Item	Buffer memory address		Reference section
	CH1	CH2	
Execution log options	40E2H	40F2H	Section 8.1.2

9.4.10 Programmable controller CPU monitoring system setting

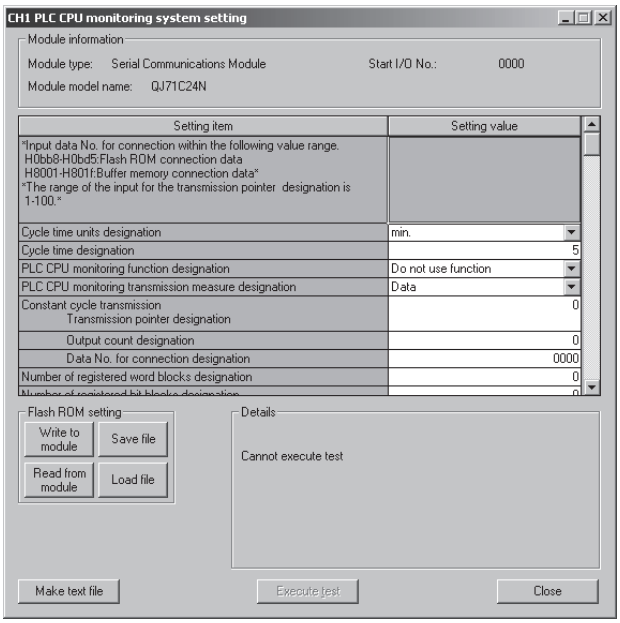
[Purpose]

Register system setting values to use the programmable controller CPU monitoring function.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ Monitoring system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ Monitoring system setting

[Setting screen]



[Setting items]

Setting item			Buffer memory address CH1	Buffer memory address CH2	Reference section
Cycle time units designation			2040H	2140H	User's Manual (Application)
Cycle time designation			2041H	2141H	
PLC CPU monitoring function designation			2042H	2142H	
PLC CPU monitoring transmission measure designation			2043H	2143H	
Constant cycle transmission	Transmission pointer designation		2044H	2144H	
	Output count designation		2045H	2145H	
	Data No. for connection designation		2046H	2146H	
Number of registered word blocks designation			204DH	214DH	
Number of registered bit blocks designation			204EH	214EH	
PLC CPU abnormal monitoring designation			204FH	214FH	
No. 1 block monitoring device	Monitoring device designation		2050H	2150H	
	Head device No. designation		2051H to 2052H	2151H to 2152H	
	Read point designation		2053H	2153H	
	Condition agreement transmission	Monitoring condition designation	2054H	2154H	
		Monitoring condition value designation	2055H	2155H	
		Transmission pointer designation	2056H	2156H	
		Output count designation	2057H	2157H	
		Data No. for connection designation	2058H	2158H	
No. 2 to 10 block monitoring device			2059H to 20A9H	2159H to 21A9H	
PLC CPU abnormal monitoring designation	Condition agreement transmission	Transmission pointer designation	20E6H	21E6H	
		Output count designation	20E7H	21E7H	
		Data No. for connection designation	20E8H	21E8H	

9.4.11 Transmission user frame No. designation system setting

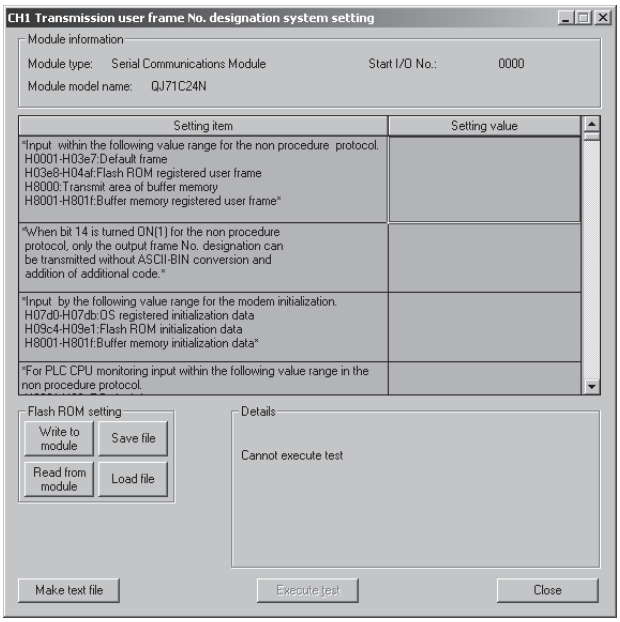
[Purpose]

Register the output frame number to transmit data with the non procedure protocol using the user frame.

[Operating procedure]

- Online operation
  [Monitor] screen → CH☐ Output frame system setting
- Offline operation
  [Flash ROM setting] screen → CH☐ Output frame system setting

[Setting screen]


CH1 Transmission user frame No. designation system setting
Module information
Module type: Serial Communications Module
Start I/O No.: 0000
Module model name: QJ71C24N
Setting item
Setting value
*Input within the following value range for the non procedure protocol.
H0001-H03e7:Default frame
H03e8-H04af:Flash ROM registered user frame
H8000:Transmit area of buffer memory
H8001-H801f:Buffer memory registered user frame*
When bit 14 is turned ON(1) for the non procedure protocol, only the output frame No. designation can be transmitted without ASCII-BIN conversion and addition of additional code.
*Input by the following value range for the modem initialization.
H07d0-H07db:OS registered initialization data
H09c4-H09e1:Flash ROM initialization data
H8001-H801f:Buffer memory initialization data*
*For PLC CPU monitoring input within the following value range in the non procedure protocol.
Flash ROM setting
Write to module
Save file
Read from module
Load file
Details
Cannot execute test
Make text file
Execute test
Close

[Setting item]

Item	Buffer memory address		Reference section
	CH1	CH2	
Output frame No. designation 1st to 100th	BA$_H$ to 11D$_H$	15A$_H$ to 1BD$_H$	User's Manual (Application)

9.4.12 Resetting the buffer memory/flash ROM setting values to the default values

This section explains how to reset the values set in the buffer memory/flash ROM to their default values.

[Startup procedure]

[Online] → [Monitor/Test] →"Select monitor/Test module" → Monitor/Test → [Monitor] screen

[Operating procedure]

(Procedure 1) In the [Monitor] screen, select [Default request] for [System setting default].

(Procedure 2) Click on Execute test.

The setting values in the buffer memory will return to their default values.

(Procedure 3) Change the setting of [Flash ROM write allow/prohibit] to "Allowed."

(Procedure 4) In the [Monitor] screen, select [Write request] for [System setting write].

(Procedure 5) Click on Execute test.

The setting values in the flash ROM will return to their default values.

* When confirming the processing results in GX Configurator-SC, perform Read from module.

(Items subject to this operation in the [Monitor] screen)

Setting item	Current value	Setting value
System setting can be made default with the following procedure. Execute test "System setting default" Make "Flash ROM write allow/prohibit designation" "Allow" Execute test "System setting write"		
System setting default	Default request	Default request
Flash ROM write allow/prohibit designation	Allow	Allow
System setting write	Write request	Write request

9.4.13 Flash ROM write allow/prohibit setting

This section explains the settings to allow or prohibit writing to the flash ROM.

[Startup procedure]

[Online] → [Monitor/Test] → "Select monitor/Test module" → Monitor/Test → [Monitor] screen

[Operating procedure]

(Procedure 1) In the [Monitor] screen, select [Flash ROM write allow/prohibit] and set "Allowed" or "Prohibited".

(Procedure 2) Click on Execute test.

[Flash ROM write allow/prohibit] will be set to "Allowed" or "Prohibited", accordingly.

9.5 Auto Refresh Setting

The auto refresh settings are used to automatically store information stored in the Q series C24's buffer memory into a specified device of the programmable controller CPU. By setting the auto refresh, the read and write processing of the Q series C24's buffer memories on the program are not necessary.
For details, see Section 4.6.

9.6 Monitor/Test

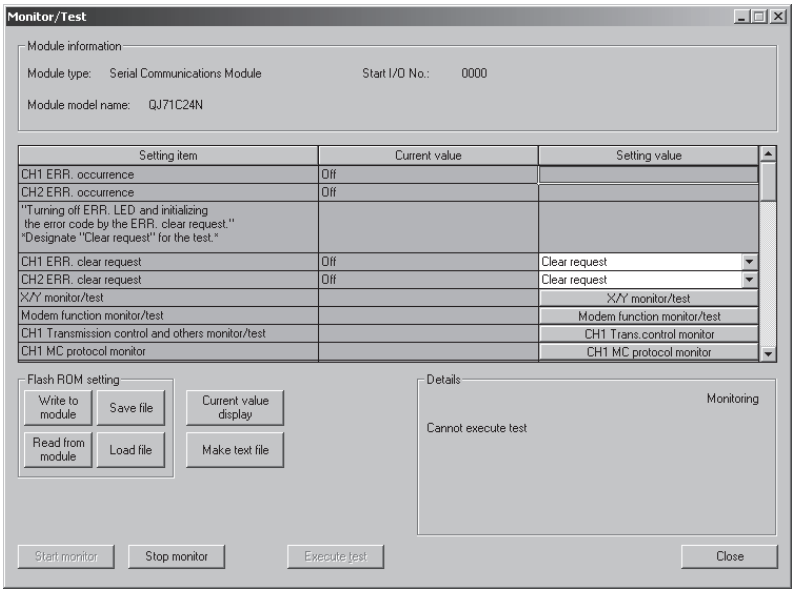
[Purpose]

The displayed menu screen is used to perform various operations, including the monitoring of the Q series C24's operating status and setting values and the testing of its output signals. The monitor/test operations can be performed only via online operation.

[Operating procedure]

* Startup from Intelligent function module utility
  (GX Developer Version 4 or later)
  [Online] → [Monitor/Test] → "Select monitor/Test module" → Monitor/Test → [Monitor] screen
* Startup from the system monitor (GX Developer Version 6 or later).
  [GX Developer] → [Diagnostics] → [System Monitor] → "Select the Q series C24 by installation status" → Diagnostics... → [Monitor] screen

[Monitor/Test screen]



[Monitor/Test items]

The following selection menus for monitor/test operation will be displayed.

Function	Reference section containing explanation
ERR. occurrence	Section 9.6.11
ERR. clear request (Communication error information, error code information)	
X/Y monitor/test	Section 9.6.1
Modem function monitor/test	Section 9.6.2
Transmission control and others monitor/test	Section 9.6.3
MC protocol monitor	Section 9.6.4
Non procedure monitor/test	Section 9.6.5
Bidirectional monitor	Section 9.6.6
Pre-defined protocol monitor/test	Section 9.6.7
PLC CPU monitoring monitor	Section 9.6.8
Transmission user frame No. designation monitor	Section 9.6.9
Monitor/test others	Section 9.6.10
System setting default, system setting write	Section 9.4.12
Flash ROM write allow/prohibit designation	Section 9.4.13

9.6.1 X/Y monitor/test

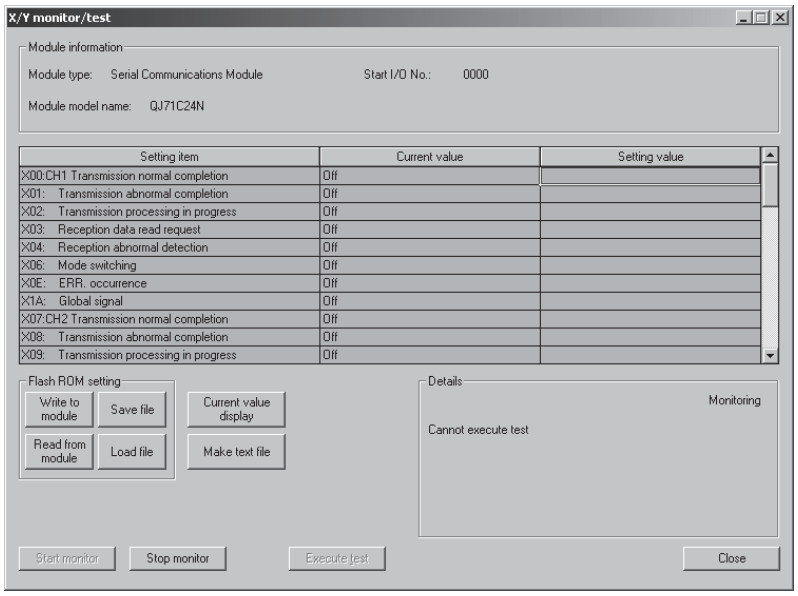
[Purpose]

Perform the monitoring of I/O signals and testing of output signals.

[Operating procedure]

[Monitor] screen → X/Y monitor/test

[Monitor/Test screen]



[Monitor/Test items]

Item	Buffer memory address		Reference section
	CH1	CH2	
X00: CH1 Transmission normal completion	—		Section 3.8
X01: CH1 Transmission abnormal completion	—		
X02: CH1 Transmission processing in progress	—		
X03: CH1 Reception data read request	—		
X04: CH1 Reception abnormal detection	—		
X06: CH1 Mode switching	—		
X0E: CH1 ERR. Occurrence	—		
X1A: CH1 Global signal	—		
X07: CH2 Transmission normal completion	—		
X08: CH2 Transmission abnormal completion	—		
to	to		
Y18: Flash ROM write request	—		
Y19: Flash ROM system setting request	—		
Y1C: System setting default request	—		

9.6.2 Modem function monitor/test

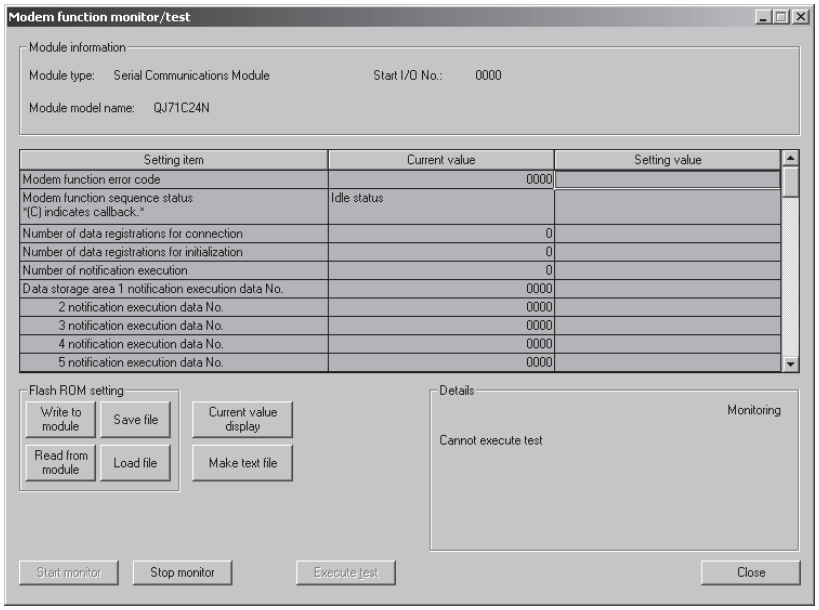
[Purpose for monitor/test]

Monitor/test the operating status and setting values of the modem function.

[Operating procedure]

[Monitor] screen → Modem function monitor/test

[Monitor/Test screen]



[Monitor/Test items]

Item	Buffer memory address		Reference section
	CH1	CH2	
Modem function error code	221H		User's Manual (Application)
Modem function sequence status	222H		
Number of data registrations for connection	223H		
Number of data registrations for initialization	226H		
Number of notification execution	229H		
Data storage area 1 notification execution data No.	22AH		
Data storage area 2 notification execution data No.	22EH		
Data storage area 3 notification execution data No.	232H		
Data storage area 4 notification execution data No.	236H		
Data storage area 5 notification execution data No.	23AH		
X10: Modem initialization completion	—		
X11: Dial in progress	—		
X12: Connection in progress	—		
X13: Initialization/connection abnormal completion	—		
X14: Modem disconnection completion	—		
X15: Notification normal completion	—		
X16: Notification abnormal completion	—		
Y10: Modem initialization request	—		

Item	Buffer memory address		Reference section
	CH1	CH2	
Y11: Connection request	—		User's Manual (Application)
Y12: Modem disconnection request	—		
Y14: Notification-issued request	—		
Modem connection channel designation	2E$_H$		
Notification execution designation	2F$_H$		
Number of connection retires designation	30$_H$		
Connection retry interval designation (units: s)	31$_H$		
Initialization/connection timeout designation (units: s)	32$_H$		
Number of initialization retries designation	33$_H$		
Data No. for initialization designation	34$_H$		
Data No. for connection designation	35$_H$		
GX Developer designation	36$_H$		
No-communication interval time designation (units: min)	37$_H$		
RS / CS control yes/no designation	38$_H$		
Modem initialization time DR signal valid/invalid designation	2008$_H$		
Wait time of notification (units: s)	200A$_H$		
Circuit disconnect wait time (PLC CPU watch use) (units: s)	200E$_H$		
Remote password mismatch notification count designation	200C$_H$		
Remote password mismatch notification accumulated count designation	200D$_H$		
Accumulated count of unlock process normal completion	22FB$_H$		
Accumulated count of unlock process abnormal completion	22FC$_H$		
Accumulated count of lock process based on circuit disconnection	22FF$_H$		
Auto modem initialization designation	2007$_H$		
Callback function designation	2001$_H$		
Callback denial notification accumulated count designation	2002$_H$		
Data No. for Callback designation 1 to 10	2101$_H$ to 210A$_H$		
Callback permit accumulated count	22F0$_H$		
Callback denial accumulated count	22F1$_H$		
Auto (callback) connection permit accumulated count	22F2$_H$		
Auto (callback) connection denial accumulated count	22F3$_H$		
Accumulated count of callback receive procedure cancel	22F4$_H$		

[Test Items]

The following accumulated count of times counter values can be cleared to "0" by the select test function.

Item	Buffer memory address		Reference section
	CH1	CH2	
Accumulated count of unlock process normal completion	22FB$_H$		User's Manual (Application)
Accumulated count of unlock process abnormal completion	22FC$_H$		
Accumulated count of lock process based on circuit disconnection	22FF$_H$		
Callback permit accumulated count	22F0$_H$		
Callback denial accumulated count	22F1$_H$		
Auto (callback) connection permit accumulated count	22F2$_H$		
Auto (callback) connection denial accumulated count	22F3$_H$		
Accumulated count of callback receive procedure cancel	22F4$_H$		

[Operation procedure]

(Step 1) Display the "Modem function monitor/test" screen.

(Step 2) Click the setting value area of the item to be cleared to "0".

(Step 3) Click the "Execute test".

The counter value of the selected item becomes "0".

9.6.3 Transmission control and others monitor/test

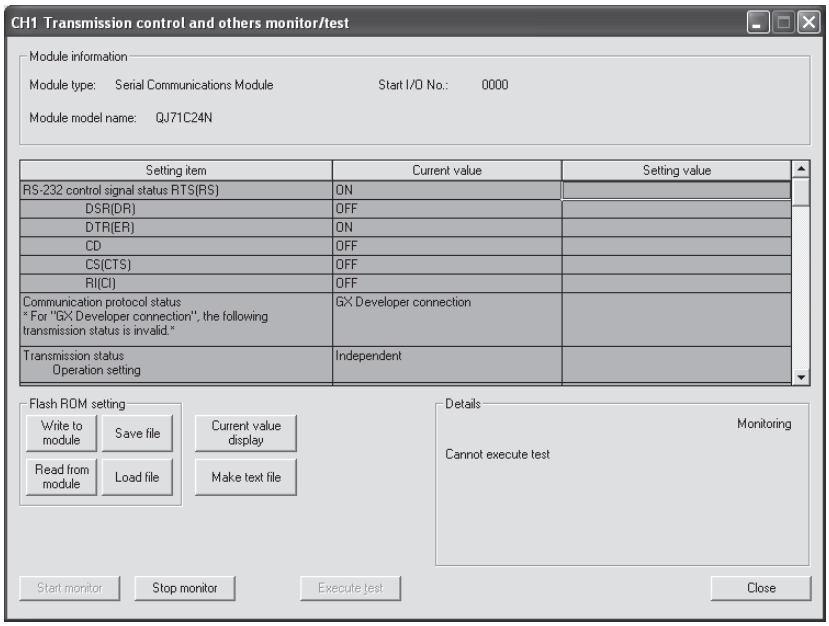
[Purpose]

Monitor the RS-232 signal status and the various setting values for data communication.

[Operating procedure]

[Monitor] screen → CH□ Transmission control monitor/test

[Monitor/Test screen]



[Monitor/Test items]

Item		Buffer memory address		Reference section
		CH1	CH2	
RS-232 control signal status	RTS (RS)	254H	264H	Section 4.4.1
	DSR (DR)			
	DTR (ER)			
	CD			
	CS (CTS)			
	RI (CI)			
Communication protocol status		252H	262H	Section 4.5.2
Transmission status	Operation setting	253H	263H	
	Data bit			
	Parity bit enable/disable			
	Even/odd parity			
	Stop bit			
	Sum check code			
	Write during RUM			
	Setting modification			

Item		Buffer memory address CH1	Buffer memory address CH2	Reference section
Transmission status	Transmission speed	253H	263H	Section 4.5.2
DTR/DSR (ER/DR), DC control designation		93H	133H	User's Manual (Application)
DC1/DC3 (Xon/Xoff) code designation		94H	134H	
DC2/DC4 code designation		95H	135H	
Communication system designation		98H	138H	Section 4.5.2
CD terminal check designation		97H	137H	
Half-duplex communications control designation Simultaneous transmission priority/non-priority designation		99H	139H	User's Manual (Application)
Half-duplex communications control designation Retransmission time transmission method designation		9AH	13AH	
No-reception monitoring time (timer 0) designation (units: byte)		9CH	13CH	User's Manual (Application)
Response monitoring time (timer 1) designation (units: 100 ms)		9DH	13DH	
Transmission monitoring time (timer 2) designation (units: 100 ms)		9EH	13EH	
Word/byte units designation		96H	136H	User's Manual (Application)
RTS (RS) designation		92H	132H	Section 3.2.1
DTR (ER) designation		92H	132H	
Transmission control start free area		2012H	2112H	User's Manual (Application)
Transmission control end free area		2013H	2113H	
Send/Recv data monitoring designation		2018H	2118H	User's Manual (Application)
Action for buffer full		2019H	2119H	
Stop by Timer 0 error		2019H	2119H	
Monitor buffer head address		201AH	211AH	
Monitor buffer size		201BH	211BH	
Transmission buffer memory head address designation		A2H	142H	Chapters 6 and 7
Transmission buffer memory length designation		A3H	143H	
Receive buffer memory head address designation		A6H	146H	
Receive buffer memory length designation		A7H	147H	
Transmission transparent code designation 1st		11FH	1BFH	User's Manual (Application)
Transmission transparent code designation 2nd to 10th		2030H to 2038H	2130H to 2138H	
Receive transparent code designation		120H	1C0H	
ASCII-BIN conversion designation		121H	1C1H	User's Manual (Application)
Receive interrupt-issued designation		2010H	2110H	User's Manual (Application)
Echo back enable/disable setting (for RS-422/485 I/F)		—	1C2H	Section 3.3.4

9.6.4 MC protocol monitor

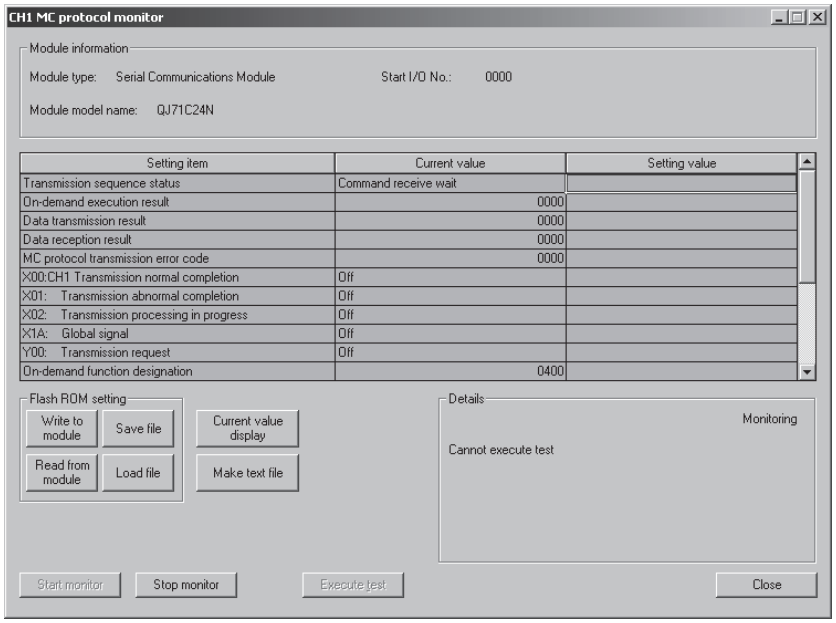
[Purpose]

Monitor the status and setting values of the data communication using the MC protocol.

[Operating procedure]

[Monitor] screen → CH☐ MC protocol monitor

[Monitor screen]



[Monitor items]

Item		Buffer memory address CH1	Buffer memory address CH2	Reference section
Transmission sequence status		255H	265H	Chapter 11 Reference Manual
On-demand execution result		256H	266H	
Data transmission result		257H	267H	
Data reception result		258H	268H	
MC protocol transmission error code		25AH	26AH	
X00: CH1 Transmission normal completion/ X07: CH2 Transmission normal completion		—	—	
X01: CH1 Transmission abnormal completion/ X08: CH2 Transmission abnormal completion				
X02: CH1 Transmission processing in progress/ X09: CH2 Transmission processing in progress				
X1A: CH1 Global signal/ X1B: CH2 Global signal				
Y00: CH1 Transmission request/ Y07: CH2 Transmission request				
On-demand function designation	Buffer memory head address designation	A0H	140H	
	Data length designation	A1H	141H	
On-demand user frame designation	First frame No. designation 1st	A9H	149H	User's Manual (Application)
	First frame No. designation 2nd	AAH	14AH	
	Last frame No. designation 1st	ABH	14BH	
	Last frame No. designation 2nd	ACH	14CH	
Message wait time designation (units: 10 ms)		11EH	1BEH	User's Manual (Application)

9.6.5 Non procedure monitor/test

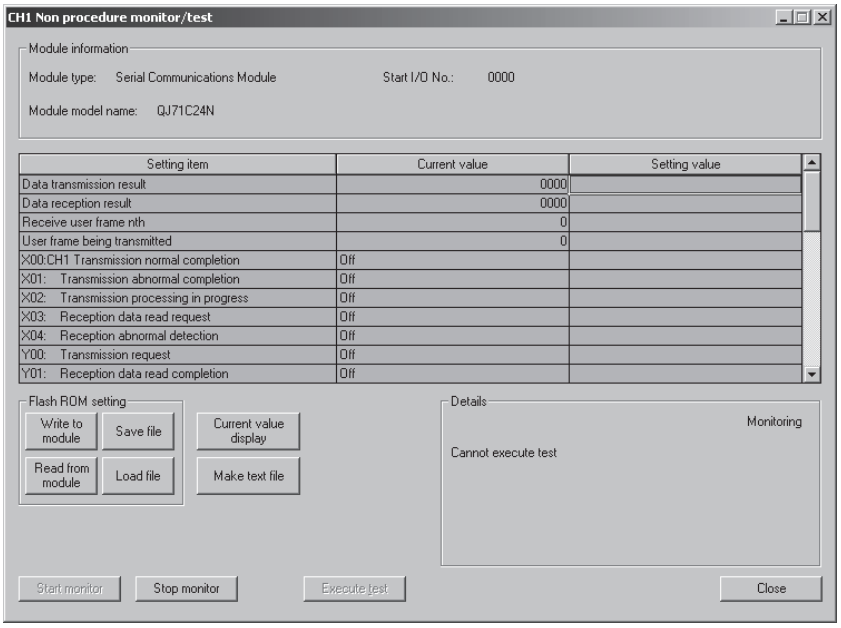
[Purpose]

Monitor the status and setting values of the data transmission using the non procedure protocol. The test operation for the receive data clear is explained in Section 9.7.

[Operating procedure]

[Monitor] screen → CH□ Non procedure monitor/test

[Monitor/Test screen]



[Monitor/Test items]

Item		Buffer memory address CH1	Buffer memory address CH2	Reference section
Data transmission result		257H	267H	Chapter 11
Data reception result		258H	268H	
Receive user frame nth		25BH	26BH	User's Manual (Application)
User frame being transmitted		B6H	156H	
X00: CH1 Transmission normal completion/ X07: CH2 Transmission normal completion		—	—	Chapter 6
X01: CH1 Transmission abnormal completion/ X08: CH2 Transmission abnormal completion				
X02: CH1 Transmission processing in progress/ X09: CH2 Transmission processing in progress				
X03: CH1 Reception data read request/ X0A: CH2 Reception data read request				
X04: CH1 Reception abnormal detection/ X0B: CH2 Reception abnormal detection				
Y00: CH1 Transmission request/ Y07: CH2 Transmission request				
Y01: CH1 Reception data read completion/ Y08: CH2 Reception data read completion				
Received data count designation		A4H	144H	
Receive complete code designation		A5H	145H	
Receive user frame designation	User frame use enable/disable designation	ADH	14DH	User's Manual (Application)
	First frame No. designation 1st to 4th	AEH to B1H	14EH to 151H	
	Last frame No. designation 1st to 4th	B2H to B5H	152H to 155H	
	User frame receive format designation 1st to 4th	2020H to 2023H	2120H to 2123H	
	Exclusive format-1 received data count 1st to 4th	2024H to 2027H	2124H to 2127H	
Transmission user frame designation	CR/LF output designation	B7H	157H	
	Output head pointer designation	B8H	158H	
	Output count designation	B9H	159H	
Timeout at No-protocol		2014H	2114H	User's Manual (Application)
Receive data clear request		A8H	148H	Chapter 6

9.6.6 Bidirectional monitor

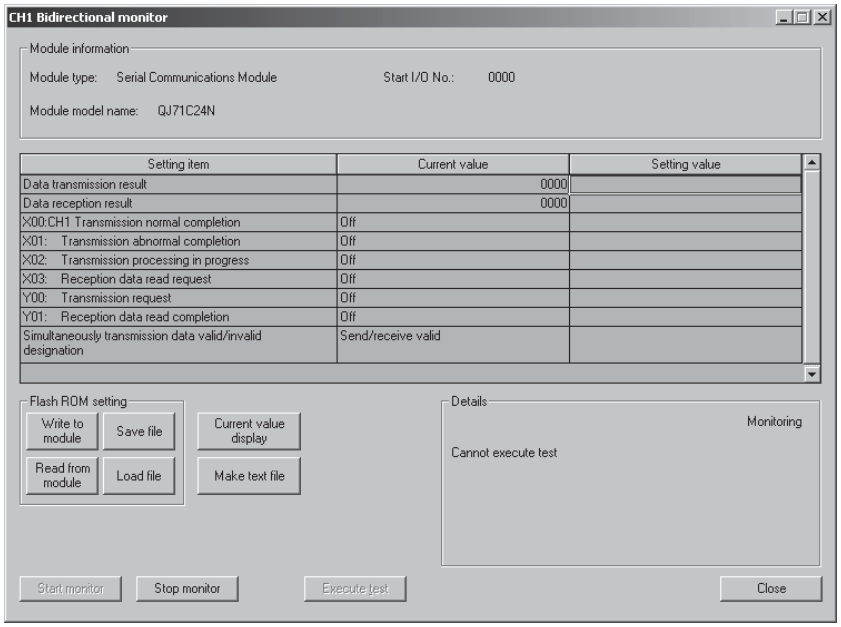
[Purpose]

Monitor the status and setting values of the data transmission using the bidirectional protocol.

[Operating procedure]

[Monitor] screen → CH□ Bidirectional monitor

[Monitor screen]



[Monitor items]

Item	Buffer memory address		Reference section
	CH1	CH2	
Data transmission result	257H	267H	Chapter 11
Data reception result	258H	268H	
X00: CH1 Transmission normal completion/ X07: CH2 Transmission normal completion	—	—	Chapter 7
X01: CH1 Transmission abnormal completion/ X08: CH2 Transmission abnormal completion			
X02: CH1 Transmission processing in progress/ X09: CH2 Transmission processing in progress			
X03: CH1 Reception data read request/ X0A: CH2 Reception data read request			
Y00: CH1 Transmission request/ Y07: CH2 Transmission request			
Y01: CH1 Reception data read completion/ Y08: CH2 Reception data read completion			
Simultaneously transmission data valid/invalid designation	9BH	13BH	Section 7.3

9.6.7 Pre-defined protocol monitor/test

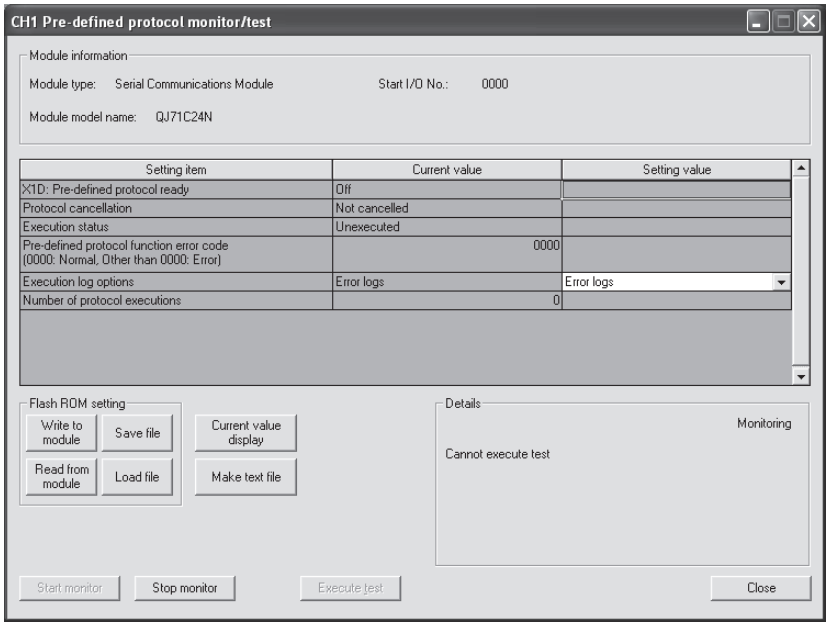
[Purpose]

Monitor the data communication status and test the values set for the pre-defined protocol.

[Operating procedure]

[Monitor] screen → CH□ Pre-defined protocol monitor/test

[Monitor/Test screen]



[Monitor/Test items]

Item	Buffer memory address		Reference section
	CH1	CH2	
X1D: Pre-defined protocol ready	—	—	Section 8.1.5
Protocol cancellation	4040H	4050H	Operating Manual (Pre-defined protocol support function)
Execution status	4041H	4051H	Section 8.1.3 and 8.1.4
Pre-defined protocol function error code	4042H	4052H	Section 11.2.1
Execution log options	40E2H	40F2H	Section 8.1.3 and 8.1.4
Number of protocol executions	4043H	4053H	Section 3.9 and 8.1.3

9.6.8 PLC CPU monitoring monitor

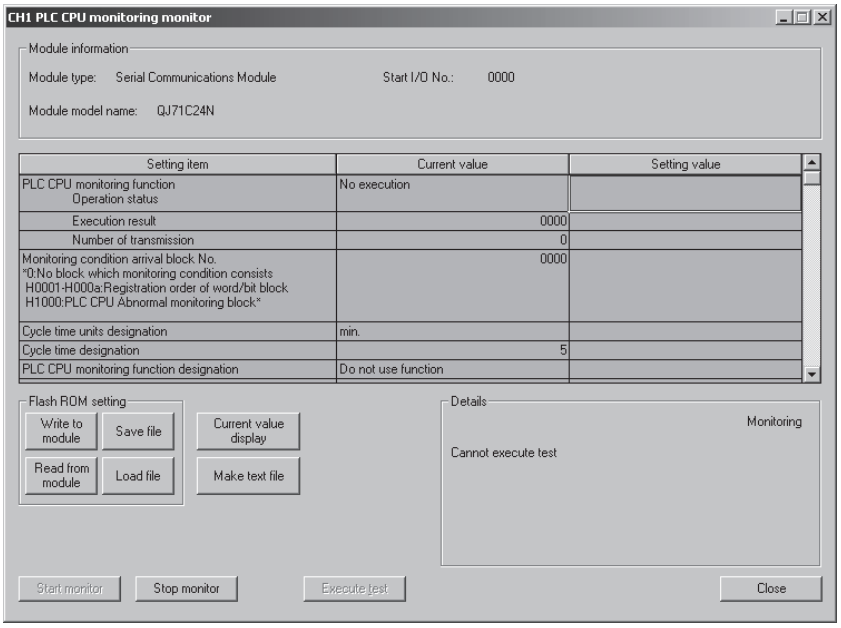
[Purpose]

Monitor the operating status and setting values of the programmable controller CPU monitoring function.

[Operating procedure]

[Monitor] screen → CH☐ Monitoring monitor

[Monitor screen]



[Monitor items]

Item			Buffer memory address CH1	Buffer memory address CH2	Reference section
PLC CPU monitoring function	Operation status		2204H	2304H	User's Manual (Application)
	Execution result		2205H	2305H	
	Number of transmission		2206H	2306H	
Monitoring condition arrival block No.			2207H	2307H	
Cycle time units designation			2040H	2140H	
Cycle time designation			2041H	2141H	
PLC CPU monitoring function designation			2042H	2142H	
PLC CPU monitoring transmission measure designation			2043H	2143H	
Constant cycle transmission	Transmission pointer designation		2044H	2144H	
	Output count designation		2045H	2145H	
	Data No. for connection designation		2046H	2146H	
Number of registered word blocks designation			204DH	214DH	
Number of registered bit blocks designation			204EH	214EH	
PLC CPU abnormal monitoring designation			204FH	214FH	
No. 1 block monitoring device	Monitoring device designation		2050H	2150H	
	Head device No. designation		2051H to 2052H	2151H to 2152H	
	Read point designation		2053H	2153H	
	Condition agreement transmission	Monitoring condition designation	2054H	2154H	
		Monitoring condition value designation	2055H	2155H	
		Transmission pointer designation	2056H	2156H	
		Output count designation	2057H	2157H	
		Data No. for connection designation	2058H	2158H	
No. 2 to 10 block monitoring device			2059H to 20A9H	2159H to 21A9H	
PLC CPU abnormal monitoring designation	Condition agreement transmission	Transmission pointer designation	20E6H	21E6H	
		Number of output designation	20E7H	21E7H	
		Data No. for connection designation	20E8H	21E8H	

9.6.9 Transmission user frame No. designation monitor

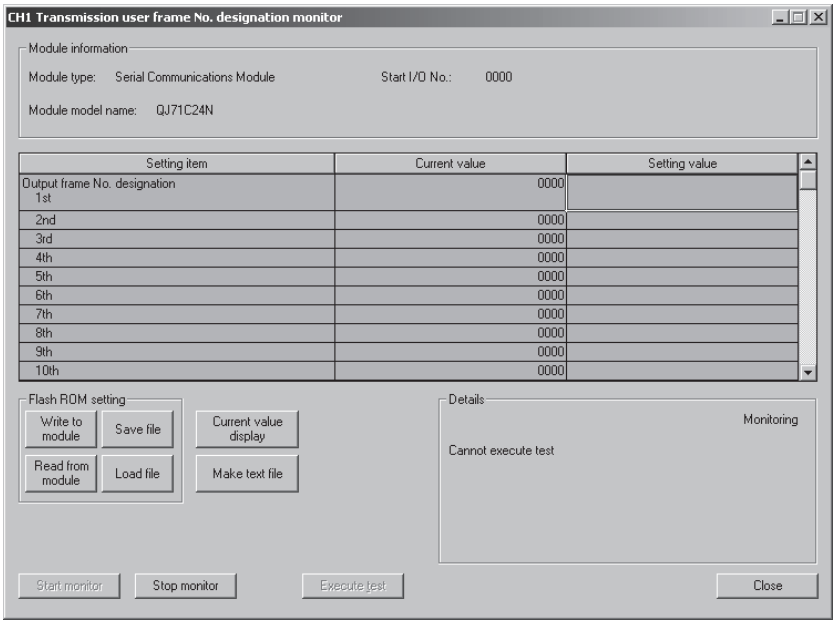
[Purpose]

Monitor the setting value of output frame number used when transmitting data with the non procedure protocol using the user frame.

[Operating procedure]

[Monitor] screen → CH□ Output frame monitor

[Monitor screen]



[Monitor item]

Item	Buffer memory address		Reference section
	CH1	CH2	
Output frame No. designation 1st to 100th	BA$_H$ to 11D$_H$	15A$_H$ to 1BD$_H$	User's Manual (Application)

9.6.10 Monitor/test others

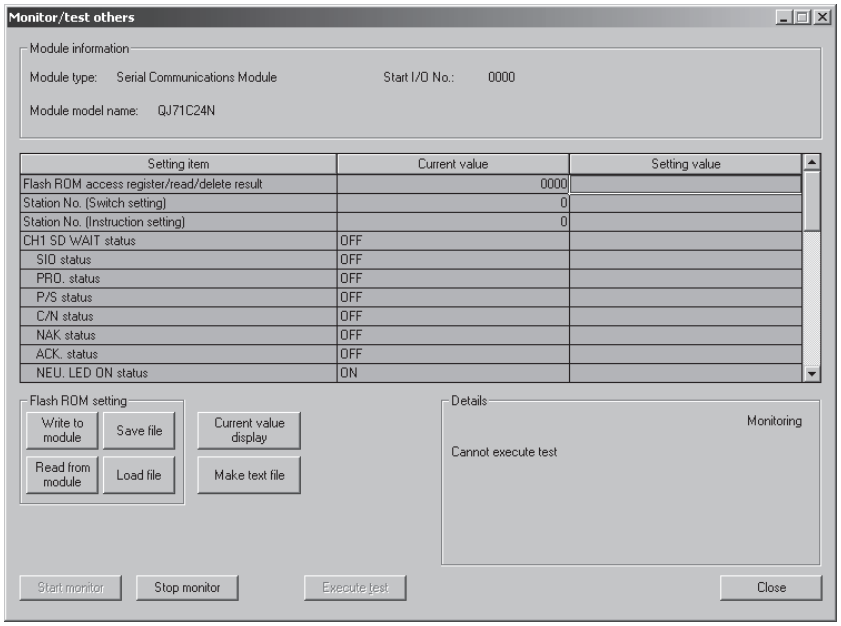
[Purpose]

Monitor the result of access to the flash ROM, the data communication status of each interface, and the result of the intelligent function module switch settings using GX Developer.

[Operating procedure]

[Monitor] screen → Monitor/test others

[Monitor/Test screen]



[Monitor/Test items]

Item		Buffer memory address CH1	Buffer memory address CH2	Reference section
Flash ROM access register/read/delete result		4H		Chapter 11
Station No. (Switch setting)		200H		
Station No. (Instruction setting)		24FH		
CH1	SD WAIT status	201H	—	
	SIO status			
	PRO. status			
	P/S status			
	C/N status			
	NAK status			
	ACK. status			
	NEU. LED status			
	ERR. LED status	202H		
Communication error clear request for CH1 and to turn LED off		0H		
CH2	SD WAIT status	—	202H	
	SIO status			
	PRO. status			
	P/S status			
	C/N status			
	NAK status			
	ACK. status			
	NEU. LED status			
	ERR. LED status			
Communication error clear request for CH2 and to turn LED off			1H	
CH1 Communication protocol setting No. error		203H	—	
CH1 Transmission speed setting error				
CH1 Mode switching error of setting change prohibit time				
CH2 Communication protocol setting No. error		—	203H	
CH2 Transmission speed setting error				
CH2 Mode switching error of setting change prohibit time				
Set station No. out of range error		203H		
Linked operation setting error				
Number of registered user frames		204H		
Number of registered default registration frames		21EH		
Flash ROM system parameters write result		220H		
PLC CPU information clear request		80H		

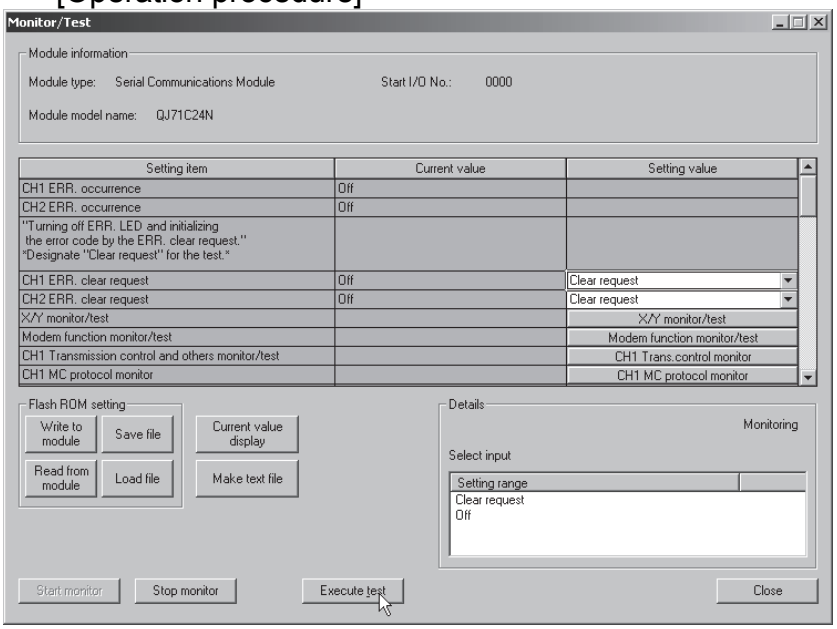
9.6.11 Display LED off and communication error information/error code initialization

This section explains how to turn off the display LEDs of the Q series C24 and initialize its communication error information and error codes.

(1) CH☐ ERR. clear request on Monitor/Test screen

This is used to turn off the CH☐ ERR. LED of the Q series C24 and to initialize (clear) the error codes stored in the CH☐ side buffer memory.
Refer to Section 11.1.2 (1) for the buffer memory where the error codes are stored.

[Operation procedure]



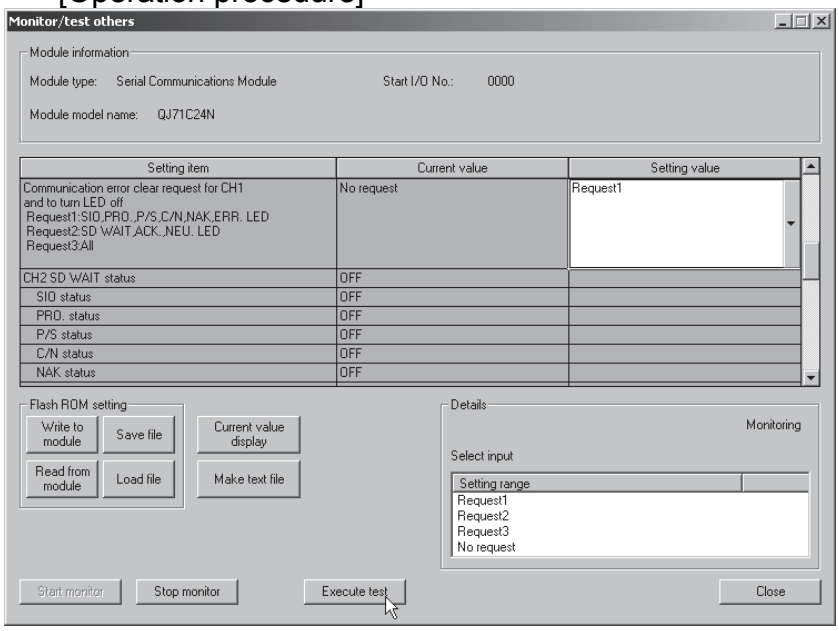
1) Display the "Monitor/Test" screen.
2) Select "Clear request" for "CH☐ ERR. clear request".
3) Click on Execute test .

(2) Communication error clear request for CH☐ and to turn LED off on Monitor/test others screen

This is used to turn off the CH☐ LED of the Q series C24 and to initialize (clear) the communication error information.

The CH☐ LED on status and communication error information can be confirmed on the Monitor/test others screen.

[Operation procedure]



1) Display the "Monitor/test others" screen.

2) Select any of "Request 1 to 3" for "Communication error clear request for CH☐ and to turn LED off".

Setting range	Target of LED off/communication error information initialization
Request 1	SIO, PRO., P/S, C/N, NAK, ERR. LED (*1)
Request 2	SD WAIT, ACK., NEU. LED
Request 3	All of Requests 1 and 2

*1 The ERR. LED is turned off. (However, it is not turned off if an error has occurred on either the CH1 or CH2 side.)

3) Click on Execute test.

9.7 Non Procedure Protocol Receive Data Clear

This section explains how to clear the received data using the non procedure protocol.

By using this function, the receive data can be cleared from GX Configurator-SC while the communication with the non procedure protocol is still in progress, without resetting the programmable controller CPU or turning off the power.

[Operation procedure]

(Procedure 1) Display the [Non procedure monitor/test] screen. (See Section 9.6.5.)
(Procedure 2) Set [Clear request issued] for "Receive data clear request".
(Procedure 3) Click on Execute test.
The received data will be cleared.

POINT
Clear the received data when transmission/reception are not in progress with the external device. Executing a receive data clear while the data transmission is in progress causes the Q series C24 to stop the data transmission abruptly, resulting in an abnormal completion of the dedicated transmission instruction. (The transmission completion signal will not be lit.) When the receive data clear is executed while the data reception is in progress, the data received up to that point will be cleared.

10 DEDICATED INSTRUCTIONS

Dedicated instructions are used to simplify programming when using intelligent function module functions.
This chapter describes the dedicated instructions for the Q series C24, which is part of the functions of the QCPU (in Q mode) explained in this manual.

10.1 Dedicated Instruction List and Available Devices

(1) Dedicated instruction list

The following table lists the dedicated instructions explained in this chapter.

Application	Dedicated instruction	Description of function	Explanation page
On-demand function transmission	ONDEMAND ＊1	Sends data using the on-demand function of the MC protocol.	Section 10.2
Non procedure protocol communication	OUTPUT ＊1	Sends data for the specified data count.	Section 10.3
	INPUT ＊1	Reads received data.	Section 10.4
Bidirectional protocol communication	BIDOUT ＊1	Sends data for the designated data count.	Section 10.5
	BIDIN ＊1	Reads received data.	Section 10.6
Predefined protocol communication	CPRTCL	Executes the protocol setting data written to the flash ROM using the predefined protocol support function.	Section 10.7
Communication status confirmation	SPBUSY	Reads the status of data transmission/reception via a dedicated instruction.	Section 10.8
Receive data clear	CSET	Perform the receive data clear without stopping the transmission processing during the non procedure protocol.	Section 10.9

POINT

The user should not change data values (control data, request data, etc.) designated by a dedicated instruction until the execution of the dedicated instruction is completed.

＊1 To change the following values preset in the buffer memory for use of dedicated instructions, use GX Configurator-SC or execute the CSET instruction (Initial setting) before starting data exchange. (See the User's Manual (Application).)
- Word/byte units designation (address: 96H/136H)
- Buffer memory head address designation for on-demand function designation (address: A0H/140H)
- Transmission buffer memory head address designation (address: A2H/142H)
- Transmission buffer memory length designation (address: A3H/143H)
- Receive buffer memory head address designation (address: A6H/146H)
- Receive buffer memory length designation (address: A7H/147H)

The dedicated instructions are executed based on the values preset in the buffer memory at module startup or those that have been changed by the CSET instruction (Initial setting).

(2) Available devices

The following devices are available for the dedicated instructions:

Internal devices		File register	Constant *2
Bit *1	Word		
X, Y, M, L, F, V, B	T, ST, C, D, W	R, ZR	K, H

*1 Word device bit designation can be used as bit data.
Word device bit designation is done by designating [Word device] . [Bit No.].
(Designation of bit numbers is done in hexadecimal.)
For example, bit 10 of D0 is designated as [D0.A].
However, there can be no bit designation for timers (T), retentive timers (ST) and counters (C).

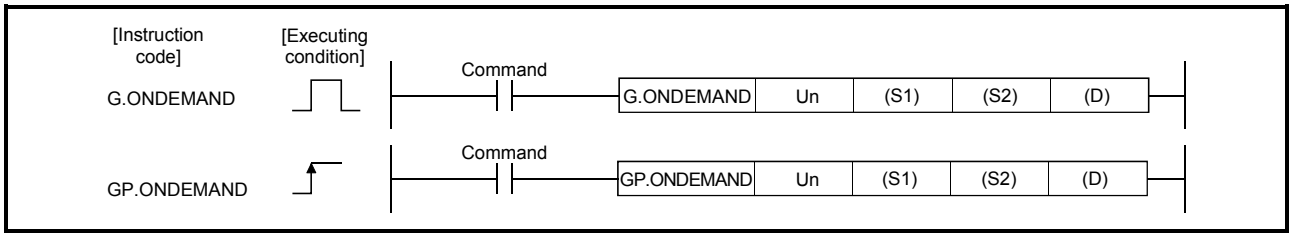
*2 Available devices are given in each of the Constant field.

10 - 2

10.2 G(P).ONDEMAND

Data can be sent using the on-demand function of the MC protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—					
(S2)	—	○		—					
(D)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Head number of the devices in which control data is stored.	User, system	Device name
(S2)	Head number of the devices in which transmission data is stored.	User	
(D)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

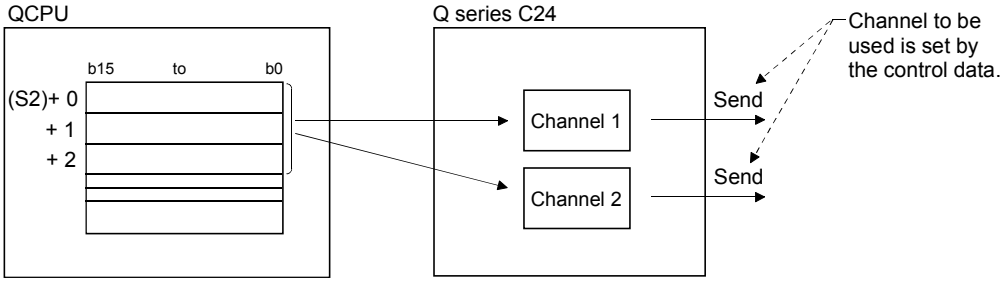
Control data

Device	Item	Set data	Setting range	Set by *3
(S1) + 0	Transmission channel	• Set transmission channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S1) + 1	Transmission result	• Result read by an ONDEMAND instruction is stored. 0: Normal Other than 0: Error code *1	—	System
(S1) + 2	Transmission data count	• Set the transmission data count. *2	1 or more	User

*1 For error codes relating to abnormal completion, see Chapter 11.
*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated.
*3 The settings are done by either of the following:
- User : Data set by the user before executing the ONDEMAND instructions.
- System : The programmable controller CPU stores the execution result of the ONDEMAND instructions.

Function

(1) Data stored in the device designated in (S2) and succeeding devices are sent according to the control data of the device designated in (S1) and succeeding devices, via the on-demand function of the MC protocol of the module designated in Un.



(2) Simultaneous execution of dedicated instructions
The following table lists the handling for when executing another instruction during execution of the ONDEMAND instruction or executing the ONDEMAND instruction during execution of another instruction in the same channel.

Instruction *1	Availability of simultaneous execution	Handling of simultaneous execution
ONDEMAND	×	• The next instruction will be ignored until the active instruction has been completed. (However, simultaneous execution is available when channels to be used are not the same.)
CSET	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later. (However, simultaneous execution is available when channels to be used are not the same.)
PUTE GETE SPBUSY	○	—
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

○: Available ×: Not available

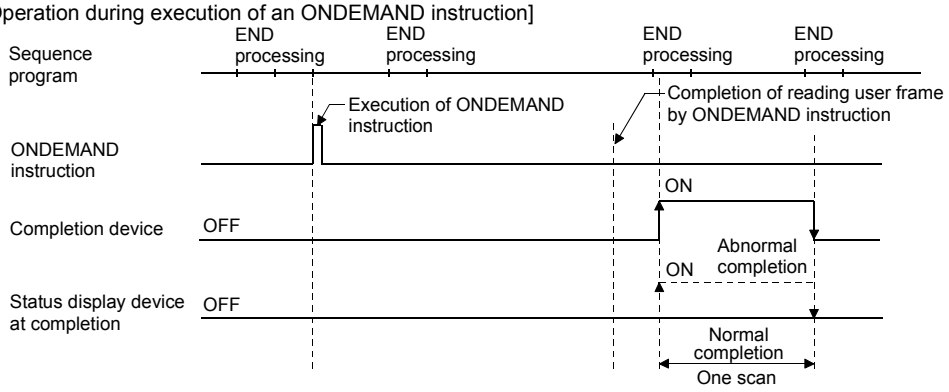
*1 Because the dedicated instructions listed below use a different communication protocol from that for the ONDEMAND instruction, they are not used in the same channel.
• OUTPUT, PRR, INPUT, BIDOUT, BIDIN, BUFRCVS, CPRTCL
If the dedicated instructions above are used in the same channel with the ONDEMAND instruction, the communication protocol setting error (7FF2H) occurs. (Except for the BUFRCVS instruction)

(3) Whether an ONDEMAND instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device : Turns on at the END processing of the scan where the ONDEMAND instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the ONDEMAND instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the ONDEMAND instruction is completed, and turns off at the next END processing.

[Operation during execution of an ONDEMAND instruction]



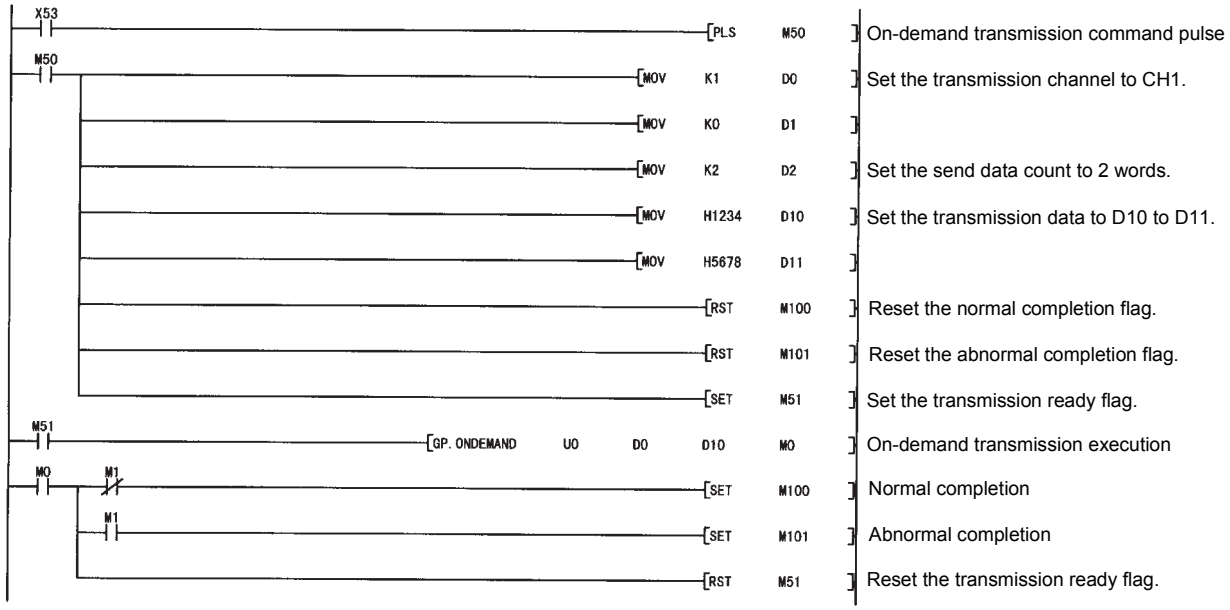
Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal, (D)+1, turns on and the error code is stored in the transmission result (S1)+1.
In case of operation errors, the error flag (SM0) turns on and the error code is stored in the SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 11.2

Program example

The following example shows a program that sends data stored in D10 to D11 using an on-demand transmission.

When input/output signals of the Q series C24 are from X/Y00 to X/Y1F:



POINT

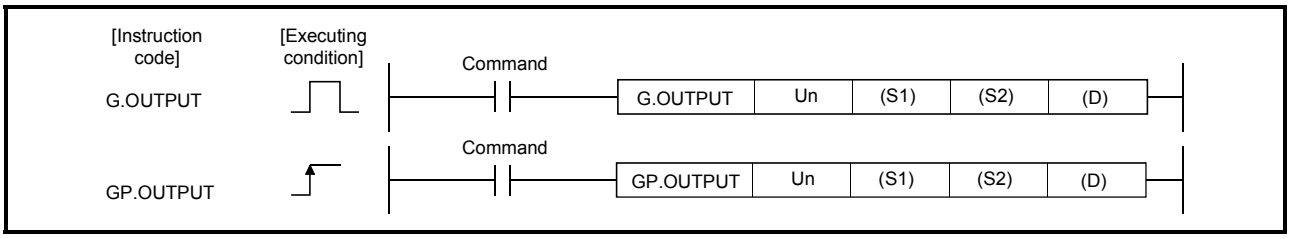
(1) The status of communication via dedicated instructions can be read using the SPBUSY instruction.

(2) Designate the storage capacity of transmission data (stored in D10 to D11 in the program example above) and data length (stored in D2 in the program example above) within the range of the buffer memory the user has assigned for an on-demand function.

10.3 G(P).OUTPUT

Data can be sent in any user-defined message format using the non procedure protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—					
(S2)	—	○		—					
(D)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Head number of the devices in which control data is stored.	User, system	Device name
(S2)	Head number of the devices in which transmission data is stored.	User	
(D)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *3
(S1) + 0	Transmission channel	• Set transmission channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S1) + 1	Transmission result	• Transmission result by an OUTPUT instruction are stored. 0: Normal Other than 0: Error code *1	—	System
(S1) + 2	Transmission data count	• Set the transmission data count. *2	1 or more	User

*1 For error codes relating to abnormal completion, see Chapter 11.

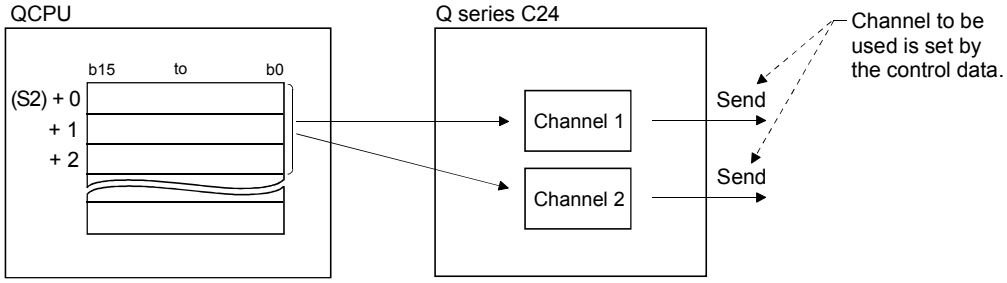
*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated and set the number of words when words are selected as the unit types.

*3 The settings are done by either of the following:

- User : Data set by the user before executing the OUTPUT instructions.
- System : The programmable controller CPU stores the execution result of the OUTPUT instructions.

Function

(1) Data stored in the device designated in (S2) and succeeding devices are sent according to the control data of the device designated in (S1) and succeeding devices, via the non procedure protocol of the module specified in Un.



(2) Simultaneous execution of dedicated instructions
The following table lists the handling for when executing another instruction during execution of the OUTPUT instruction or executing the OUTPUT instruction during execution of another instruction in the same channel.

Instruction *1	Availability of simultaneous execution	Handling of simultaneous execution
OUTPUT	×	• The next instruction will be ignored until the active instruction has been completed. (However, simultaneous execution is available when channels to be used are not the same.)
INPUT	○	—
PRR	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later. (However, simultaneous execution is available when channels to be used are not the same.)
CSET		
PUTE	○	—
GETE		
BUFRCVS		
SPBUSY		
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

○: Available ×: Not available

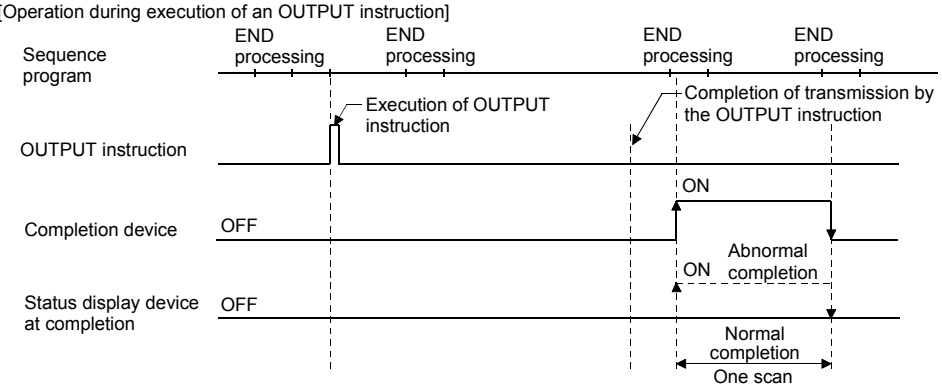
*1 Because the dedicated instructions listed below use a different communication protocol from that for the OUTPUT instruction, they are not used in the same channel.
• ONDEMAND, BIDOUT, BIDIN, CPRTCL
If the dedicated instructions above are used in the same channel with the OUTPUT instruction, the communication protocol setting error (7FF2H) occurs.

(3) Whether an OUTPUT instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device: Turns on at the END processing of the scan where the OUTPUT instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the OUTPUT instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the OUTPUT instruction is completed, and turns off at the next END processing.

[Operation during execution of an OUTPUT instruction]

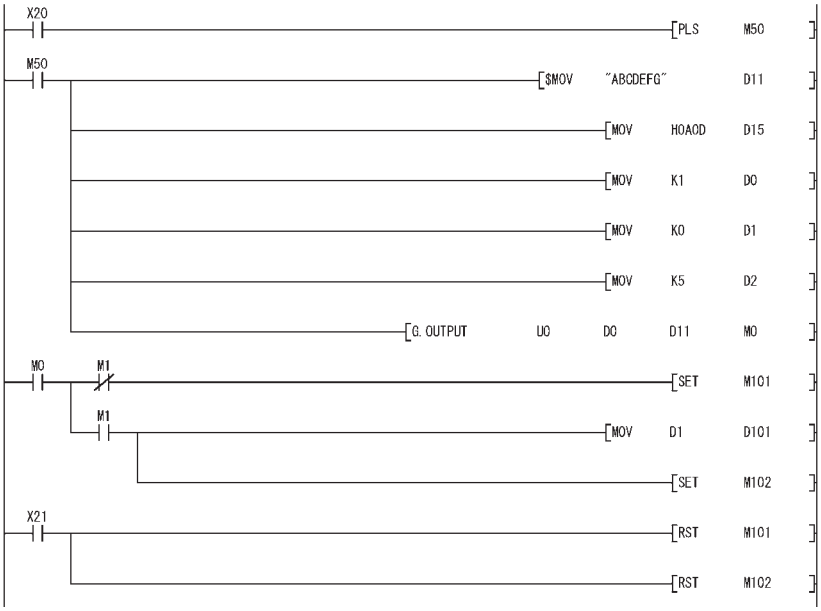


Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal, (D)+1, turns on and the error code is stored in the transmission result (S1)+1.
In case of operation errors, the error flag (SM0) turns on and the error code is stored in the SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 11.2

Program example

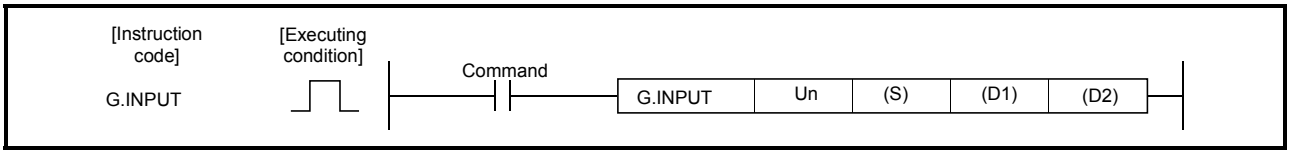
The following example shows a program that sends any data stored in D11 to D15 using the non procedure protocol.
When input/output signals of the Q series C24 are from X/Y00 to X/Y1F:


X20
PLS M50
The transmission command is converted into pulse.
M50
$MOV "ABCDEFG" D11
Transmission data is stored.
MOV H0A0D D15
MOV K1 D0
Designate the number of the interface (CH□) that will send the data.
MOV K0 D1
Clear the transmission result storage device to 0.
MOV K5 D2
Designate the transmission data count in word units. (Designate K10 when the unit is bytes.)
G. OUTPUT U0 D0 D11 M0
The transmission data stored in the designated device is sent.
M0
M1
SET M101
After the OUTPUT instruction is executed, the user designated transmission complete signal (M0) turns ON for one scan.
M1
MOV D1 D101
Storing the transmission data and writing the transmission data count in the buffer memory, and issuing a transmission request to the Q series C24 are all executed by the programmable controller CPU.
SET M102
X21
RST M101
The completion flag is reset by an external instruction.
RST M102

10.4 G.INPUT

Data can be received in any user-defined message format using the non procedure protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S)	—	○		—					
(D1)	—	○		—					
(D2)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S)	Head number of the devices in which control data is stored.	User, system	Device name
(D1)	Head number of the devices in which receive data is stored.	System	
(D2)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *3
(S) + 0	Receive channel	• Set receive channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S) + 1	Reception result	• Reception result by an INPUT instruction are stored. 0: Normal Other than 0: Error code *1	—	System
(S) + 2	Receive data count	• Receive data count is stored. *2 (0 or more)	—	System
(S) + 3	Allowable number of receive data	• Set the allowable number of words for received data that can be stored in (D1).	1 or more	User

POINT

(1) The command of G.INPUT cannot be converted into pulse.

(2) G.INPUT should be executed while the read request of the input/output signal is turned on.

∗1 For error codes relating to abnormal completion, see Chapter 11.

∗2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated.

∗3 The settings are done by either of the following:
- User : Data set by the user before executing the INPUT instructions.
- System: The programmable controller CPU stores the execution result of the INPUT instructions.

Function

(1) The function stores in the device designated in (D1) and succeeding devices the data received with the non procedure protocol of the module designated in Un, according to the control data of the device designated in (S) and succeeding devices.

(2) When the number of data actually received exceeds the allowable receive data count specified by (S)+3, only the receive data within the allowable receive data count is stored, and the remaining receive data is discarded. (The dedicated instructions are completed normally.)
In this case, the allowable receive data count is stored in the receive data count ((S)+2).

(3) Simultaneous execution of dedicated instructions
The following table lists the handling for when executing another instruction during execution of the INPUT instruction or executing the INPUT instruction during execution of another instruction in the same channel.

Instruction ∗1	Availability of simultaneous execution	Handling of simultaneous execution
OUTPUT PRR	○	—
INPUT	×	• The next instruction will be ignored until the active instruction has been completed. (However, simultaneous execution is available when channels to be used are not the same.)
CSET	(the right column)	[When instructions are executed in order of INPUT → CSET] • Dedicated instructions simultaneous execution error (7FF0H) occurs in the CSET instruction. (However, simultaneous execution is available when channels to be used are not the same.) [When instructions are executed in order of CSET → INPUT] • Simultaneous execution is available.
PUTE GETE	○	—
BUFRCVS	×	INPUT instruction and BUFRCVS instruction cannot be used at the same time. (However, simultaneous execution is available when channels to be used are not the same.)
SPBUSY	○	—
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

○: Available ×: Not available

∗1 Because the dedicated instructions listed below use a different communication protocol from that for the INPUT instruction, they are not used in the same channel.
- ONDEMAND, BIDOUT, BIDIN, CPRTCL

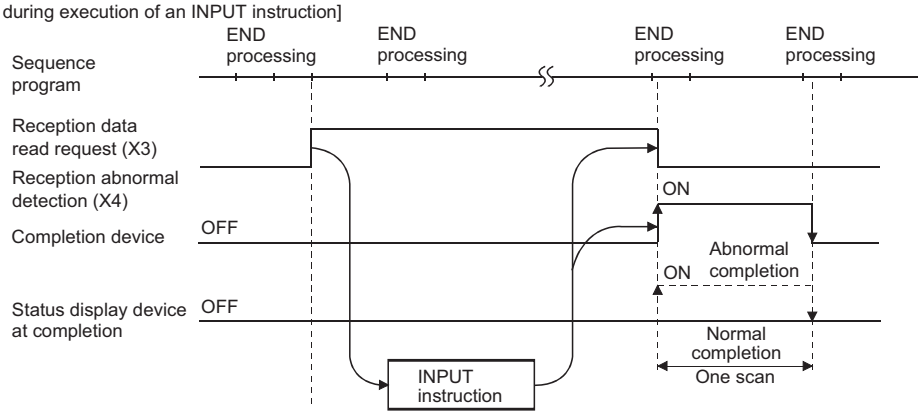
If the dedicated instructions above are used in the same channel with the INPUT instruction, the communication protocol setting error (7FF2H) occurs.

(4) Whether an INPUT instruction was completed normally or abnormally can be checked by the completion device ((D2)) or status display device at completion ((D2)+1).

(a) Completion device: Turns on at the END processing of the scan where the INPUT instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the INPUT instruction.
- Normal completion : Off with no change.
- Abnormal completion: Turns on at the END processing of the scan where the INPUT instruction is completed, and turns off at the next END processing.

[Operation during execution of an INPUT instruction]

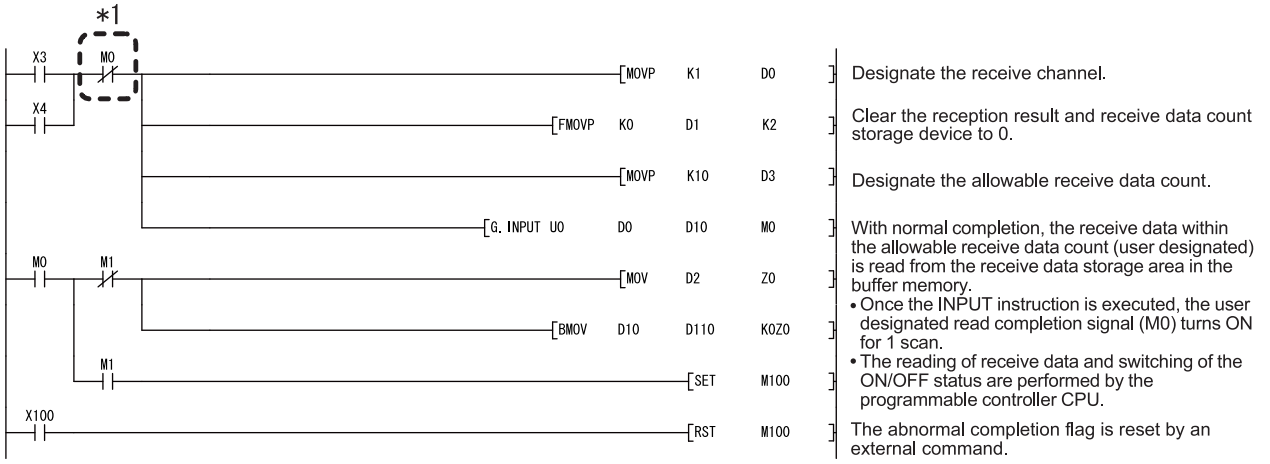


Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal (D2)+1, turns on and the error code is stored in the reception result (S)+1. In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 11.2

Program example

The following example shows a program that stores data received via the non-procedure protocol in D10 and later.
When the input/output signals of the Q series C24 are from X/Y00 to X/Y1F:

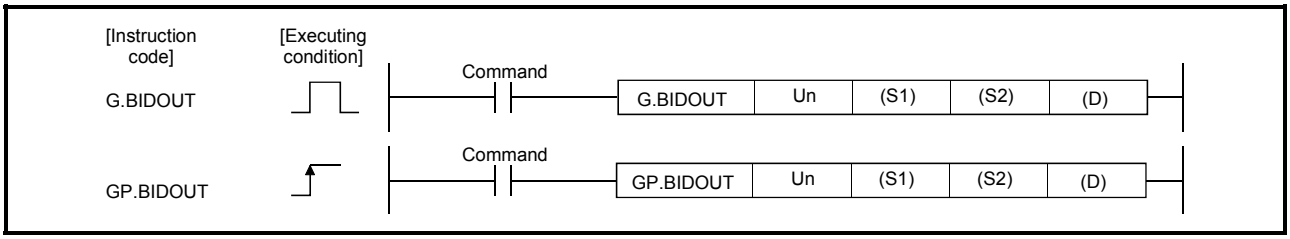

*1
X3
M0
MOVP K1 D0
Designate the receive channel.
X4
FMOVP K0 D1 K2
Clear the reception result and receive data count storage device to 0.
MOVP K10 D3
Designate the allowable receive data count.
G.INPUT U0 D0 D10 M0
With normal completion, the receive data within the allowable receive data count (user designated) is read from the receive data storage area in the buffer memory.
• Once the INPUT instruction is executed, the user designated read completion signal (M0) turns ON for 1 scan.
• The reading of receive data and switching of the ON/OFF status are performed by the programmable controller CPU.
M0
M1
MOV D2 Z0
BMOV D10 D110 KOZ0
M1
SET M100
X100
RST M100
The abnormal completion flag is reset by an external command.

* 1 When the completion device is off, execute the INPUT instruction.
If the INPUT instruction is executed when the completion device is on, data may not be received properly.

10.5 G(P).BIDOUT

Data can be sent using the bidirectional protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—					
(S2)	—	○		—					
(D)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Head number of the devices in which control data is stored.	User, system	Device name
(S2)	Head number of the devices in which transmission data is stored.	User	
(D)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *3
(S1) + 0	Transmission channel	• Set transmission channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S1) + 1	Transmission result	• Transmission result by a BIDOUT instruction are stored. 0: Normal Other than 0: Error code *1	—	System
(S1) + 2	Transmission data count	• Set the transmission data count. *2	1 or more	User

*1 For error codes relating to abnormal completion, see Chapter 11.

*2 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated.

*3 The settings are done by either of the following:
- User : Data set by the user before executing the BIDOUT instructions.
- System : The programmable controller CPU stores the execution result of the BIDOUT instructions.

Function

(1) The function sends data stored in the device designated in (S2) and succeeding devices according to the control data of the device designated in (S1) and succeeding devices, via the bidirectional protocol of the module designated in Un.

(2) Simultaneous execution of dedicated instructions
The following table lists the handling for when executing another instruction during execution of the BIDOUT instruction or executing the BIDOUT instruction during execution of another instruction in the same channel.

Instruction *1	Availability of simultaneous execution	Handling of simultaneous execution
BIDOUT	×	• The next instruction will be ignored until the active instruction has been completed. (However, simultaneous execution is available when channels to be used are not the same.)
BIDIN	○	—
CSET	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later. (However, simultaneous execution is available when channels to be used are not the same.)
PUTE GETE BUFRCVS SPBUSY	○	—
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

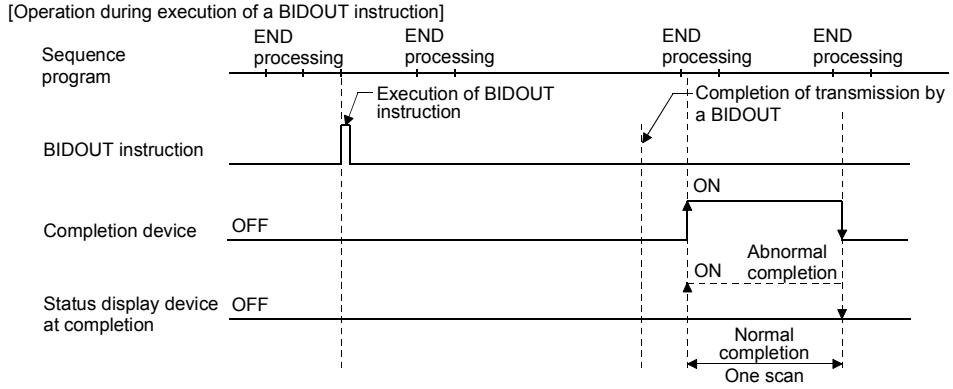
○: Available ×: Not available

*1 Because the dedicated instructions listed below use a different communication protocol from that for the BIDOUT instruction, they are not used in the same channel.
• ONDEMAND, OUTPUT, PRR, INPUT, CPRTCL
If the dedicated instructions above are used in the same channel with the BIDOUT instruction, the communication protocol setting error (7FF2H) occurs.

(3) Whether a BIDOUT instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device: Turns on at the END processing of the scan where the BIDOUT instruction is completed, and turns off at the next END processing.

(b) Status display device at completion : Turns on and off depending on the completion status of the BIDOUT instruction.
• Normal completion : Off with no change.
• Abnormal completion: Turns on at the END processing of the scan where the BIDOUT instruction is completed, and turns off at the next END processing.



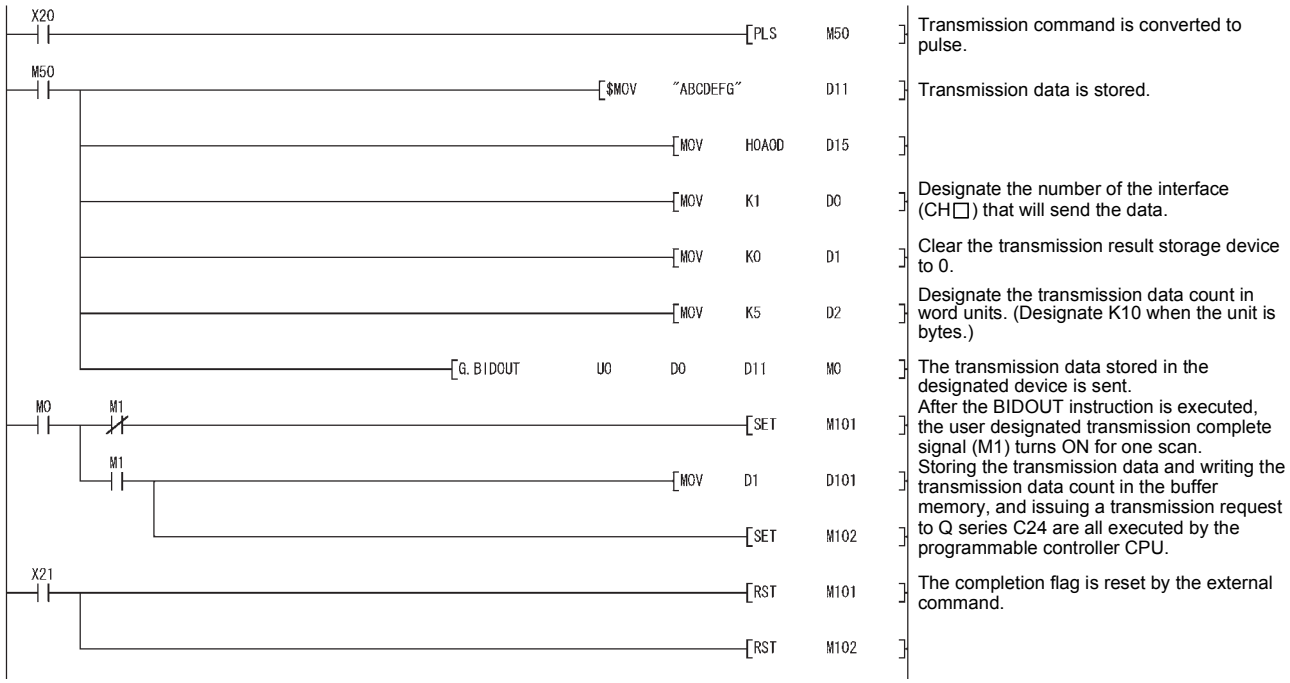
Error

(1) When a dedicated instruction is completed abnormally, the abnormal completion signal (D)+1, turns on and the error code is stored in the transmission result (S1)+1. In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 11.2

Program example

The following example shows a program that sends any data stored in D11 to D15 using the bidirectional protocol.

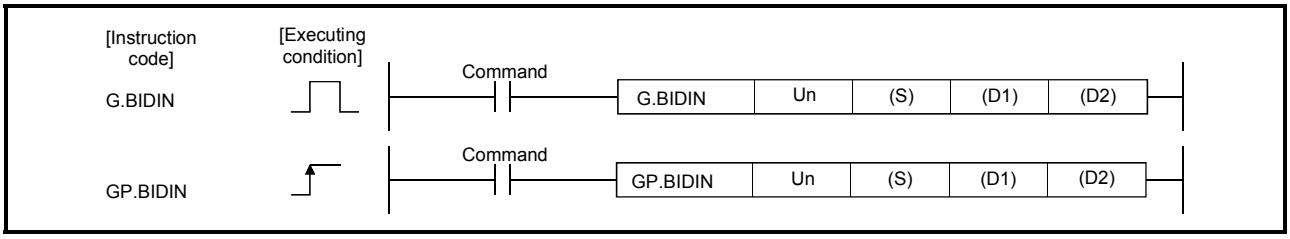
When the input/output signals of the Q series C24 are from X/Y00 to X/Y1F:


X20
PLS M50
Transmission command is converted to pulse.
M50
$MOV "ABCDEFG" D11
Transmission data is stored.
MOV H0A0D D15
MOV K1 D0
Designate the number of the interface (CH□) that will send the data.
MOV K0 D1
Clear the transmission result storage device to 0.
MOV K5 D2
Designate the transmission data count in word units. (Designate K10 when the unit is bytes.)
G.BIDOUT U0 D0 D11 M0
The transmission data stored in the designated device is sent.
After the BIDOUT instruction is executed, the user designated transmission complete signal (M1) turns ON for one scan.
Storing the transmission data and writing the transmission data count in the buffer memory, and issuing a transmission request to Q series C24 are all executed by the programmable controller CPU.
M0
M1
SET M101
M1
MOV D1 D101
SET M102
X21
RST M101
The completion flag is reset by the external command.
RST M102

10.6 G(P).BIDIN

Data can be received using the bidirectional protocol.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(S)	—	○		—					
(D1)	—	○		—					
(D2)	○	○		—					



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S)	Head number of the devices in which control data is stored.	User, system	Device name
(D1)	Head number of the devices in which receive data is stored.	System	
(D2)	Bit device number to be turned on at completion of execution.	System	Bit

The file register per local device and program cannot be used as the set data.

Control data

Device	Item	Set data	Setting range	Set by *2
(S) + 0	Receive channel	• Set receive channel 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	1, 2	User
(S) + 1	Reception result	• Reception result by a BIDIN instruction are stored. 0: Normal	—	System
(S) + 2	Receive data count	• The number of data received is stored. *1 (1 or more)	—	System
(S) + 3	Allowable number of receive data	• Set the allowable number of words for received data that can be stored in (D1).	1 or more	User

POINT

G (P).BIDIN should be executed while the read request of the input/output signal is turned on.

∗1 When setting "Word/byte units designation" by GX Configurator-SC, set the number of bytes when bytes are designated and set the number of words when words are designated as the unit types.

∗2 The settings are done by either of the following:

- User : Data set by the user before executing the BIDIN instructions.
- System : The programmable controller CPU stores the execution result of the BIDIN instructions.

Function

(1) The function stores in the device designated in (D1) and succeeding devices the data received via the bidirectional protocol of the module designated in Un, according to the control data of the device designated in (S) and succeeding devices.

(2) Simultaneous execution of dedicated instructions
The following table lists the handling for when executing another instruction during execution of the BIDIN instruction or executing the BIDIN instruction during execution of another instruction in the same channel.

Instruction ∗1	Availability of simultaneous execution	Handling of simultaneous execution
BIDOUT	○	—
BIDIN	×	• The next instruction will be ignored until the active instruction has been completed. (However, simultaneous execution is available when channels to be used are not the same.)
CSET	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later. (However, simultaneous execution is available when channels to be used are not the same.)
PUTE GETE	○	—
BUFRCVS	×	BIDIN instruction and BUFRCVS instruction cannot be used at the same time. (However, simultaneous execution is available when channels to be used are not the same.)
SPBUSY	○	—
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

○: Available ×: Not available

∗1 Because the dedicated instructions listed below use a different communication protocol from that for the BIDIN instruction, they are not used in the same channel.

- ONDEMAND, OUTPUT, PRR, INPUT, CPRTCL

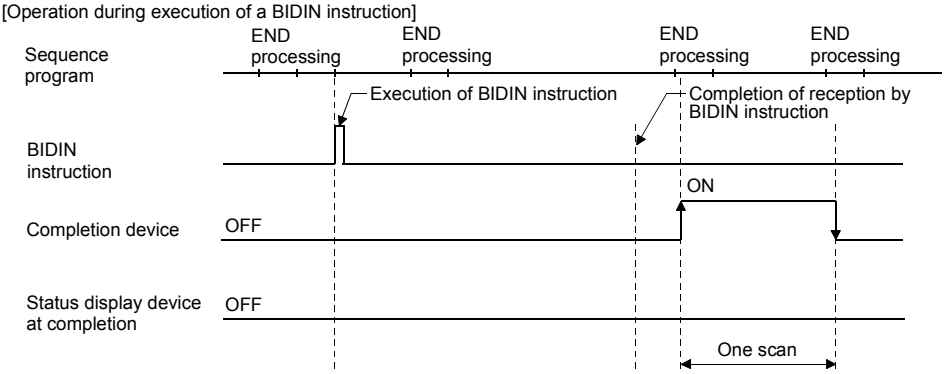
If the dedicated instructions above are used in the same channel with the BIDIN instruction, the communication protocol setting error (7FF2H) occurs.

(3) Whether a BIDIN instruction was completed normally can be checked by the completion device ((D2)) or status display device at completion ((D2)+1).

(a) Completion device: Turns on at the END processing of the scan where the BIDIN instruction is completed normally, and turns off at the next END processing.

(b) Status display device at completion: Does not change when left off.

[Operation during execution of a BIDIN instruction]



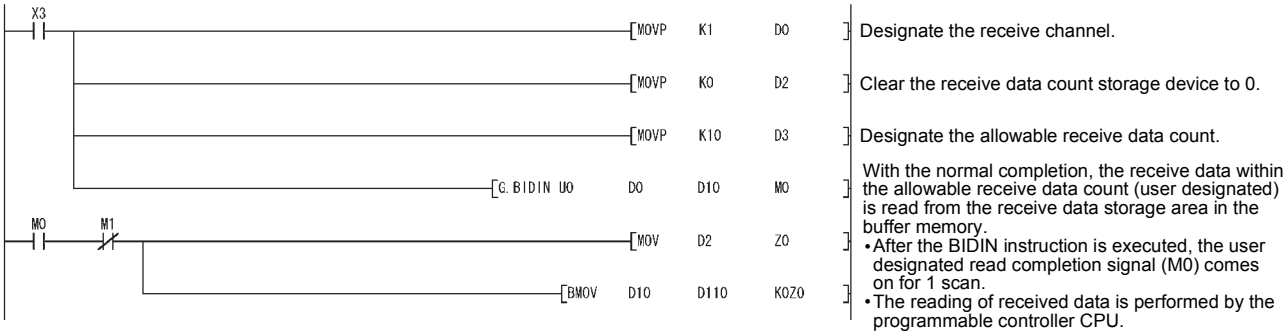
Error

(1) In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)

Program example

The following example shows a program that receives any data using the bidirectional protocol and stores that data in D10 or later.

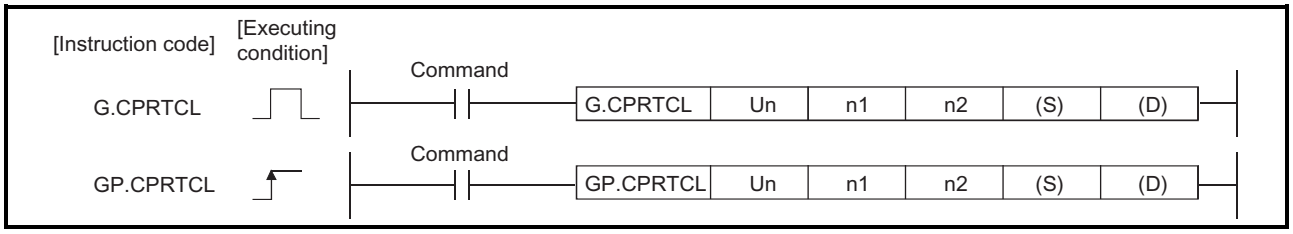
When the input/output signals of the Q series C24 are from X/Y00 to X/Y1F:


X3
MOVP K1 D0
Designate the receive channel.
MOVP K0 D2
Clear the receive data count storage device to 0.
MOVP K10 D3
Designate the allowable receive data count.
G.BIDIN U0 D0 D10 M0
With the normal completion, the receive data within the allowable receive data count (user designated) is read from the receive data storage area in the buffer memory.
•After the BIDIN instruction is executed, the user designated read completion signal (M0) comes on for 1 scan.
•The reading of received data is performed by the programmable controller CPU.
M0
M1
MOV D2 Z0
BMOV D10 D110 K0Z0

10.7 G(P).CPRTCL

Protocols and functional protocols written to the flash ROM with the predefined protocol support function can be executed.
For details of the functional protocol, refer to Section 10.7.1.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
n1	—	○		—				○	—
n2	—	○		—				○	—
(S)	—	○		—				—	—
(D)	○	○		—				—	—



Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Upper 2 digits when I/O signals are expressed in 3-digit.)	User	BIN16 bit
n1	Channel to communicate with other devices. 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)	User	BIN16-bit Device name
n2	Number of consecutive protocol executions (1 to 8)	User	BIN16-bit Device name
(S)	Start number of the device in which control data are stored.	User, system	Device name
(D)	Bit device number to be turned ON at completion of execution.	System	Bit

The file register per local device and program cannot be used as the setting data.

Control data

Device	Item	Set data	Setting range	Set by ＊1
(S) + 0	Execution result	• The execution result of the G(P). CPRTCL instruction is stored. When executing multiple protocols, the execution result of the protocol executed at last is stored. ＊2 0: Normal Other than 0: Error code ＊3	—	System
(S) + 1	Number of executions	• The number of executions is stored. Protocols with errors are included in the count. When settings of the setting data and control data contain an error, "0" is stored.	1 to 8	System
(S) + 2 : : (S) + 9	Execution protocol number designation	• Set the first protocol number or functional protocol number to be executed. ＊4 : : • Set the 8th protocol number or functional protocol number to be executed. ＊4	1 to 128, 201 to 207	User
(S) + 10 : : (S) + 17	Verification match receive packet number	• When the communication type of the first protocol executed is "Receive only" or "Send & receive", the matched receive packet number is stored. When the communication type is "Send only", "0" is stored. If the error occurs to the first protocol executed, "0" is stored. When the functional protocol is executed, "0" is stored. ＊4 : : • When the communication type of the 8th protocol executed is "Receive only" or "Send & receive", the matched receive packet number is stored. When the communication type is "Send only", "0" is stored. If the error occurs to the 8th protocol executed, "0" is stored. When the number of the executed protocols is less than 8, "0" is stored. When the functional protocol is executed, "0" is stored. ＊4	0, 1 to 16	System

＊ 1: The following are the descriptions of terms in the column.
- User : Data set by the user before executing the CPRTCL instructions.
- System : The CPU module stores the execution result of the CPRTCL instructions.

＊ 2: When executing multiple protocols, if an error occurs to the nth protocol, the protocols after the nth protocol are not executed.

＊ 3: For error codes relating to abnormal completion, refer to Chapter 11.

＊ 4: For details of the functional protocol, refer to Section 10.7.1.

Function

(1) The protocol setting data written to the flash ROM are executed by the module designated in Un.
The protocol is executed according to the control data stored in the device designated in (S) and the following devices.
The channel designated in n1 is used.

(2) Protocols are executed consecutively for the number of times designated in n2 (maximum: 8) in one instruction execution.

(3) Simultaneous execution of dedicated instructions
The following table lists the processing when executing another instruction during execution of the CPRTCL instruction or executing the CPRTCL instruction during execution of another instruction in the same channel.

Instruction*1	Availability of simultaneous execution	Processing of simultaneous execution
CPRTCL	×	• The next instruction will be ignored until the active instruction is completed. (However, simultaneous execution is available when channels to be used are not the same.)
PUTE	○	—
GETE		
SPBUSY		
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

○: Available ×: Not available

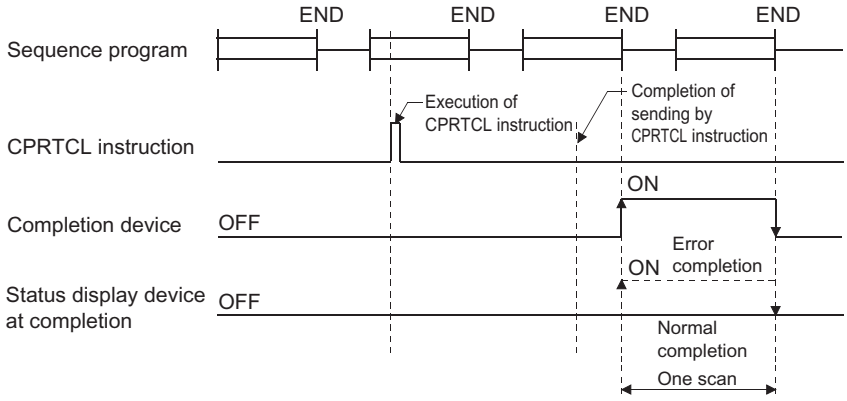
∗1: Because the dedicated instructions listed below use a different communication protocol from that for the CPRTCL instruction, they are not used in the same channel.
• ONDEMAND, OUTPUT, PRR, BIDOUT, INPUT, BIDIN, BUFRCVS, CSET
If the dedicated instructions above are used in the same channel with the CPRTCL instruction, the communication protocol setting error (7FF2H) occurs. (Except for the BUFRCVS instruction)

(4) Whether a CPRTCL instruction was completed normally or abnormally can be checked by the completion device ((D)) or status display device at completion ((D)+1).

(a) Completion device: Turns ON at the END processing of the scan where the CPRTCL instruction is completed, and turns OFF at the next END processing.

(b) Status display device at completion : Turns ON and off depending on the completion status of the CPRTCL instruction.
- Normal completion : OFF with no change.
- Error completion : Turns ON at the END processing of the scan where the CPRTCL instruction is completed, and turns OFF at the next END processing.

[Operation during execution of the CPRTCL instruction]



POINT

The following describes how to check the execution status of protocols.

(1) Checking with the buffer memory
Use the protocol execution status (address: 4041H/4051H).
For details, refer to Section 3.9.

(2) Checking with state monitor
Open the "Predefined Protocol Function" tab in the "State Monitor" screen.
For details, refer to Operating Manual (Pre-defined protocol support function).

Error

(1) When a dedicated instruction is failed, the status display device at completion ((D)+1) turns ON and the error code is stored in the execution result ((S)+0).
In case of operation errors, Error flag (SM0) turns ON and the error code is stored in SD0.
Refer to the following according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less: QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or later: Section 11.2

Program example

For the program example of the CPRTCL instruction, refer to Section 8.1.6.

Cancellation of protocol execution

A protocol can be cancelled during its execution.
This function is used to end the protocol execution forcibly when a communication error occurs with the other device.
This function is available for the predefined protocol mode only.

(1) Execution method for cancellation request
Execute a cancellation request from the sequence program.
The corresponding buffer memory areas are listed in the following table.

Address Decimal (Hex)		Name	Setting value
CH1	CH2		
16448 (4040H)	16464 (4050H)	Protocol cancellation specification	0: No cancellation specification 1: Cancellation request (Specified by User) 2: Cancel completed (set by QJ71C24N(-R2/R4))

(2) Operation after execution of cancellation request
(a) Operation of dedicated instruction (CPRTCL instruction)
- The operation fails and the error code is stored in the execution result ((S)+0).
- When executing multiple protocols consecutively, if the cancellation is requested to the nth protocol, the nth protocol is ended forcibly and the protocols after the nth protocol are not executed.

(b) Operation of QJ71C24N(-R2/R4)
- If the cancellation is requested when protocols are not executed, the cancellation is completed in no-operation.
- If the cancellation is requested when the communication protocol setting is other than the communication protocol mode, the value of the cancellation designation area is ignored.

POINT

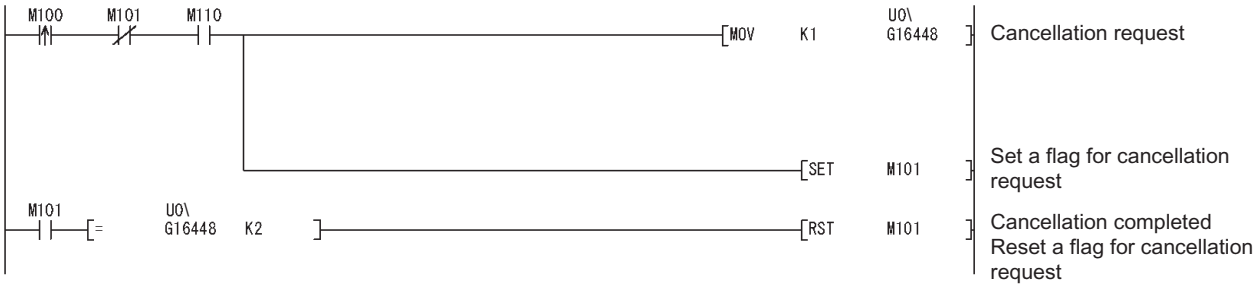
- When the protocol with the communication type of "Send & receive" is cancelled, execute the receive data clear after the cancellation.
  When the response from the other device is slow, and data are received after the cancellation, the receive data remains in the OS area (receive data area).
  For details of the receive data clear, refer to Section 6.1.4.
- When Protocol cancellation specification is "1: Cancellation request", the next CPRTCL instruction cannot be executed.

(3) Program example

The following is a program in which a cancellation is requested to the protocol being executed when the start I/O number of the QJ71C24N(-R2/R4) is 0000.

Devices used by program example

Device	Purpose
M100	Cancellation request command flag
M101	Cancellation request flag
M110	Turns ON during execution of the CPRTCL instruction.
U0\G16448	Cancellation designation area



10.7.1 Functional protocol

The following functions are available by executing functional protocols with the CPRTCL instruction.

- Receive data clear
- Send/receive data monitoring start/stop
- RS/DTR signal condition designation

(1) Setting

Specify the functional protocol number of the function to be executed in the control data ((S)+2 to (S)+9) of the CPRTCL instruction.
For details of the CPRTCL instruction, refer to Section 10.7.

(2) List of functional protocols

The following table lists the functional protocols described in this section.

Protocol number	Protocol type	Keyword *1	Reference
201	Receive data clear	Receive Data Clear	(a) in this section
202	Send/Receive data monitoring start	Send/Recv Monitor Start	(b) in this section
203	Send/Receive data monitoring stop	Send/Recv Monitor Stop	
204	Turns ER(DTR) signal ON	DTR ON	(c) in this section
205	Turns ER(DTR) signal OFF	DTR OFF	
206	Turns RS(RTS) signal ON	RS ON	
207	Turns RS(RTS) signal OFF	RS OFF	

*1: Character strings that are stored to the protocol name of the protocol execution log when functional protocols are executed.

(a) Receive data clear
Receive data in the OS area are cleared.

(b) Send/Receive data monitoring start/stop
Start or stop of send/receive data monitoring is specified.
When the functional protocol (202, 203) is executed, a monitoring start command (0001H) or monitoring stop command (0000H) is set for send/receive data monitoring designation (address: 2018H /2118H) in the QJ71C24N(-R2/R4).
For details of send/receive monitoring, refer to the User's Manual (Application).

(c) RS/DTR signal status specification
ON/OFF status of the RS(RTS)/ER(DTR) signal is specified.
When the functional protocol (204 to 207) is executed, corresponding bits of the RS/DTR signal status designation (address: 92H/132H) are turned ON/OFF in the QJ71C24N(-R2/R4).
For details of RS/DTR signal status designation, refer to Section 3.2.1.

10.8 G(P).SPBUSY

This instruction reads the status of data transmission and reception executed with dedicated instructions.

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant	Others
	Bit	Word		Bit	Word				
(D)		○		—					



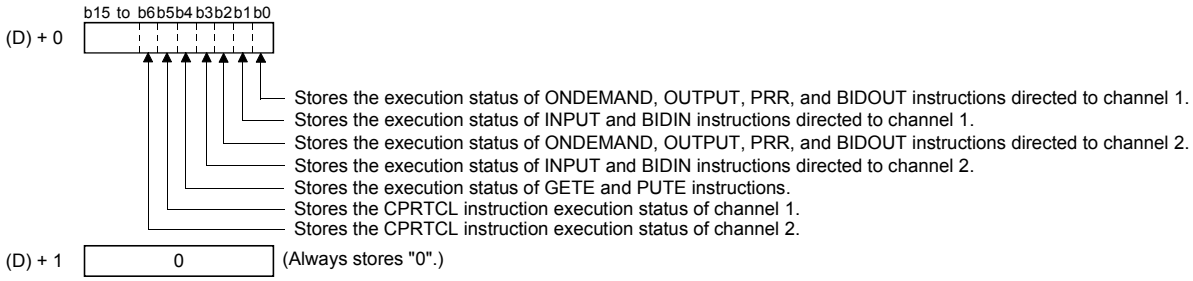
Set data

Set data	Description	Set by	Data type
Un	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(D)	Head number of devices in which the read communication status is stored.	System	Device name

Function

(1) The function reads the execution status of a dedicated instruction directed to a module designated by the start I/O signal, and stores it in the device designated by (D) or later.

(2) The execution status is stored in (D) in the form of "1" at the corresponding bit when the processing of each instruction is started, and "0" when the processing is completed.
The processing of each instruction is completed when the completion flag of each instruction is turned from on to off.


b15 to b6 b5 b4 b3 b2 b1 b0
(D) + 0
Stores the execution status of ONDEMAND, OUTPUT, PRR, and BIDOUT instructions directed to channel 1.
Stores the execution status of INPUT and BIDIN instructions directed to channel 1.
Stores the execution status of ONDEMAND, OUTPUT, PRR, and BIDOUT instructions directed to channel 2.
Stores the execution status of INPUT and BIDIN instructions directed to channel 2.
Stores the execution status of GETE and PUTE instructions.
Stores the CPRTCL instruction execution status of channel 1.
Stores the CPRTCL instruction execution status of channel 2.
(D) + 1
0
(Always stores "0".)

(3) The SPBUSY instruction is executed for every scan while the read command is ON, if the system is executing during ON. And, the instruction will be executed for a single scan when the read command rises from OFF to ON, if the system is starting up.

(4) Simultaneous execution of dedicated instructions
It is possible to execute another instruction during execution of the SPBUSY instruction and to execute the SPBUSY instruction during execution of another instruction.

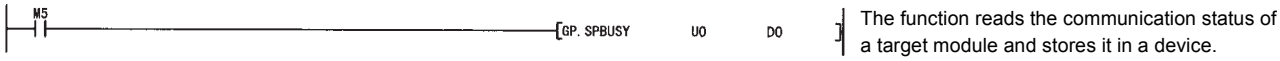
Error

(1) In case of operation errors, the error flag (SM0) turns on and the error code is stored in SD0.
See one of the following manuals according to the error code, and check and correct the error.
<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 11.2

Program example

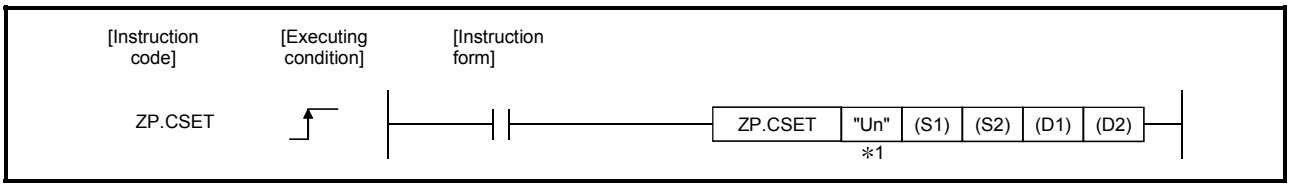
The following example shows a program that reads the communication status of a target module.

When input/output signals of the Q series C24 are from X/Y00 to X/Y1F:



10.9 ZP.CSET (Receive data clear)

Set data	Applicable device								
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant K, H	Others
	Bit	Word		Bit	Word				
(S1)	—	○		—				○	—
(S2)	—	○		—					
(D1)	—	○		—					
(D2)	○	○		—					



*1 If the originating station is a Basic model QCPU (function version B or later), or Universal model QCPU, "" (double quotation) of the first argument can be omitted.

Set data

Set data	Description	Set by	Data type
"Un"	Start I/O signal of the module (00 to FE: Top two-digit when I/O signals are expressed in 3-digit.)	User	BIN16 bit
(S1)	Number of the channel that demands to clear receiving data. 1: Channel 1 (CH1 side) 2: Channel 2 (CH2 side)		
(S2)	Head number of the device that stores the control data.	User, System	Device name
(D1)	Dummy	—	Device name
(D2)	Head number of the bit device at the self-station that turns on for one scan at the completion of the instruction. (D2) + 1 also turns on at an abnormal completion.	System	Bit

Each of file registers for local device and program cannot be used as the setting data.

Control data

Device	Item	Set data	Setting range	Set by
(S2) + 0	Execution type	Select 0.	0	User
(S2) + 1	Complete status	The execution result at the completion of the instruction is stored. 0: Normal Other than 0: Error code	—	System
(S2) + 2	Request type	Specify the request. 4: Receive data clear request	4	User
(S2) + 3 to (S2) + 111	For system	Use prohibited (including for other purposes such as programming)	—	System

REMARKS

(1) See the "Error" explanation on the following page for details on errors caused by wrong data specifications by the user.

(2) The setting sides are partitioned as follows:

- User : Data set by the user before executing the dedicated instruction.
- System : The programmable controller CPU stores the execution result of the dedicated instruction.

Function

(1) This function clears reception data in the OS area. It does not clear the user data reception area in the buffer memory.

(2) If the CSET instruction is executed while the reception data read request (X3/XA) or reception abnormal detection signal (X4/XB) is turned on, the CSET instruction is kept waiting until the signal is turned off.

(3) Simultaneous execution of dedicated instructions
The following table lists the handling for when executing another instruction during execution of the CSET instruction or executing the CSET instruction during execution of another instruction in the same channel.

Instruction *1	Availability of simultaneous execution	Handling of simultaneous execution
ONDEMAND OUTPUT PRR BIDOUT BIDIN	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later. (However, simultaneous execution is available when channels to be used are not the same.)
INPUT	(the right column)	[When instructions are executed in order of INPUT → CSET] • Dedicated instructions simultaneous execution error (7FF0H) occurs in the CSET instruction. (However, simultaneous execution is available when channels to be used are not the same.) [When instructions are executed in order of CSET → INPUT] • Simultaneous execution is available.
CSET	×	• The next instruction will be ignored until the active instruction has been completed. (However, simultaneous execution is available when channels to be used are not the same.)
PUTE GETE BUFRCVS SPBUSY	○	—
UINI	×	• Dedicated instructions simultaneous execution error (7FF0H) occurs in the dedicated instruction attempted later.

○: Available ×: Not available

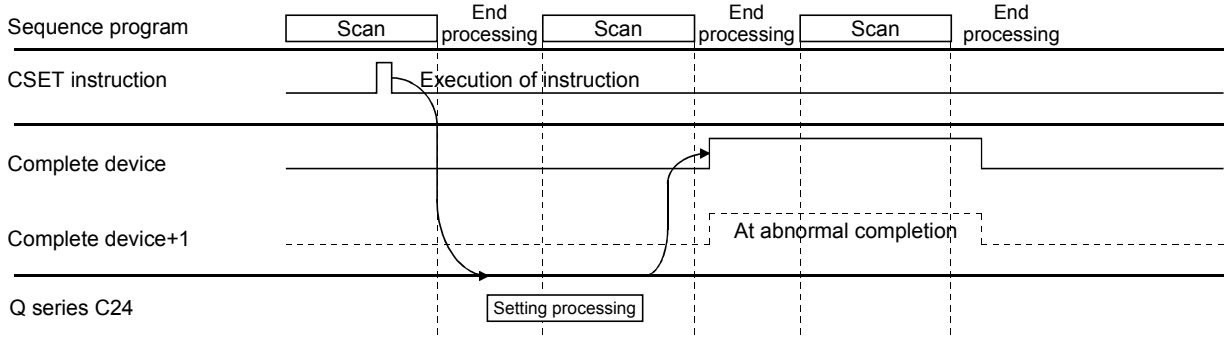
*1 The same channel cannot be used for the CPRTCL and CSET instructions because different communication protocols are used for them.
Using these instructions on the same channel will cause a communication protocol setting error (7FF2H).

(4) The status of the CSET instruction, whether it is being executed or completed normally/abnormally, can be checked by the complete device (D2) specified by the setting data.

(a) Complete device ((D2) + 0)
This device turns on at the End processing of the scan at which the CSET instruction is completed and turns off at the next End processing.

(b) Complete device ((D2) + 1)
It turns on/off by the status at which the CSET instruction is completed.
- At normal completion: It is kept turned off and does not change.
- At abnormal completion: It turns on at the END processing of the scan at which the CSET instruction is completed and turns off at the next END processing.

[Operation at execution of CSET instruction]



Error

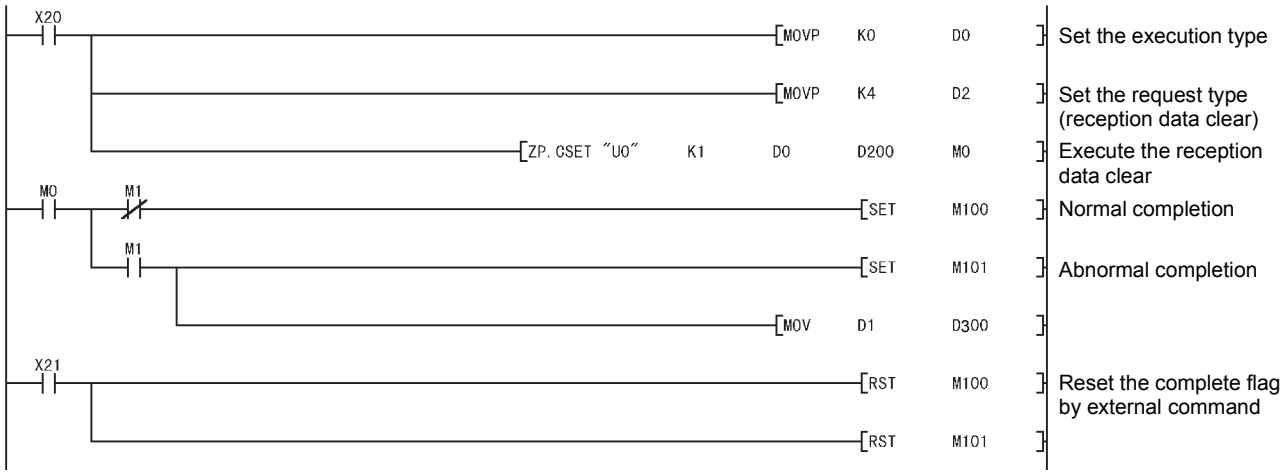
(1) If the dedicated instruction is abnormally completed, the error flag (SM0) turns on and the error code is stored in SD0.
See the following manuals according to the error code, and check/take action according to the error.

<Error code>
4FFF$_H$ or less : QCPU User's Manual
(Hardware Design, Maintenance and Inspection)
7000$_H$ or more: Section 11.2

Program example

The following example shows a program that clears reception data on the Q series C24 side.

When the input/output signals of the Q series C24 are X/Y00 to X/Y1F:



11 TROUBLESHOOTING

This chapter explains the definitions of errors that may occur during data communication between the Q series C24 and external devices, and the corrective actions.

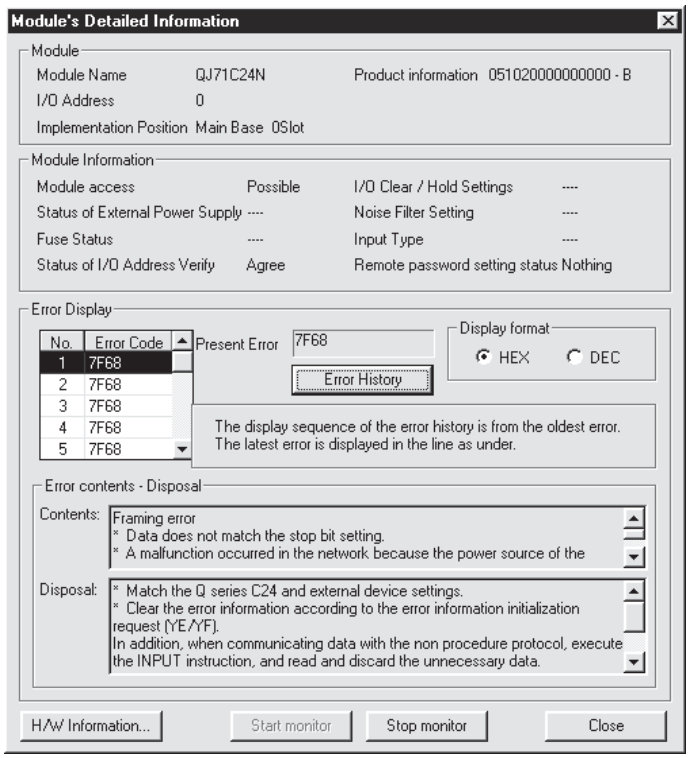
11.1 Checking the Status of the Serial Communication Module

11.1.1 Checking the LED ON status, communications error status, and switch setting status of the serial communication module

This section explains how to check the status of communication between the Q series C24 and external devices, the transmission status of the Q series C24, and the switch setting status of the Q series C24.
When a communication problem occurs, check the error status using one of the following procedures:

(1) Checking the module status and error codes in the detailed module information screen of the GX Developer diagnostic functions

[Startup procedure]
GX Developer → [Diagnostics] → [System monitor] →
Module's Detailed Information


Module's Detailed Information
Module
Module Name QJ71C24N
Product information 051020000000000 - B
I/O Address 0
Implementation Position Main Base 0Slot
Module Information
Module access Possible
I/O Clear / Hold Settings ----
Status of External Power Supply ----
Noise Filter Setting ----
Fuse Status ----
Input Type ----
Status of I/O Address Verify Agree
Remote password setting status Nothing
Error Display
No. Error Code
1 7F68
2 7F68
3 7F68
4 7F68
5 7F68
Present Error 7F68
Error History
Display format
HEX DEC
The display sequence of the error history is from the oldest error.
The latest error is displayed in the line as under.
Error contents - Disposal
Contents: Framing error
* Data does not match the stop bit setting.
* A malfunction occurred in the network because the power source of the
Disposal: * Match the Q series C24 and external device settings.
* Clear the error information according to the error information initialization request (YE/YF).
In addition, when communicating data with the non procedure protocol, execute the INPUT instruction, and read and discard the unnecessary data.
H/W Information...
Start monitor
Stop monitor
Close

11

[Displays]

- Module

  The following information is displayed:

  Module name : The name of the module installed
  I/O Address : The start input/output signal (number) of the target module
  Implementation Position : The slot position where the module is mounted
  Product information : Product information
  ∗ The last character of the product information indicates the function version of the module.
  (Example) If the last character is "B," it means that the module is of function version B.

- Unit access (Module access)

  Displays access permissions when the Q series C24 ready (X1E) is turned on and the watchdog timer error (X1F) is turned off.

- Status of I/O Address Verify

  Displays whether or not the module for which the user set the parameters matches the module installed.

- Remote password setting status

  Displays the setting status of the remote password.

- Present Error

  Displays the error code of the latest error occurrence.

- Error Display

  Displays the error codes for any errors that have occurred in any of the functions being used.

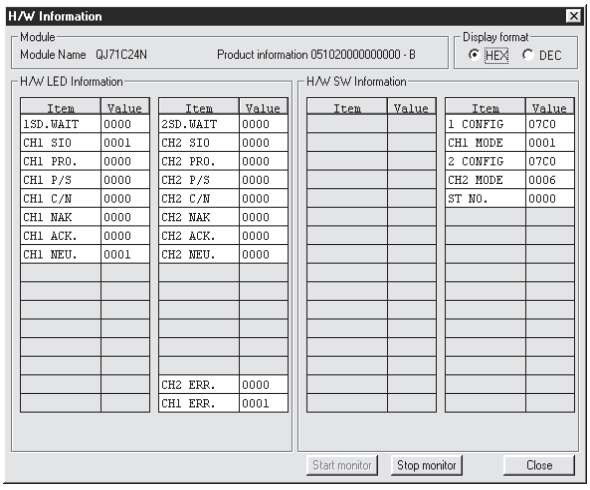
- Error details, corrective action

  Displays the error details and corrective action for the error code selected in Error Display.
  Error details and corrective actions are displayed when GX Developer Version 8.17T or later used.

(2) Checking using the hardware information screen of the GX Developer diagnostic functions

[Startup procedure]

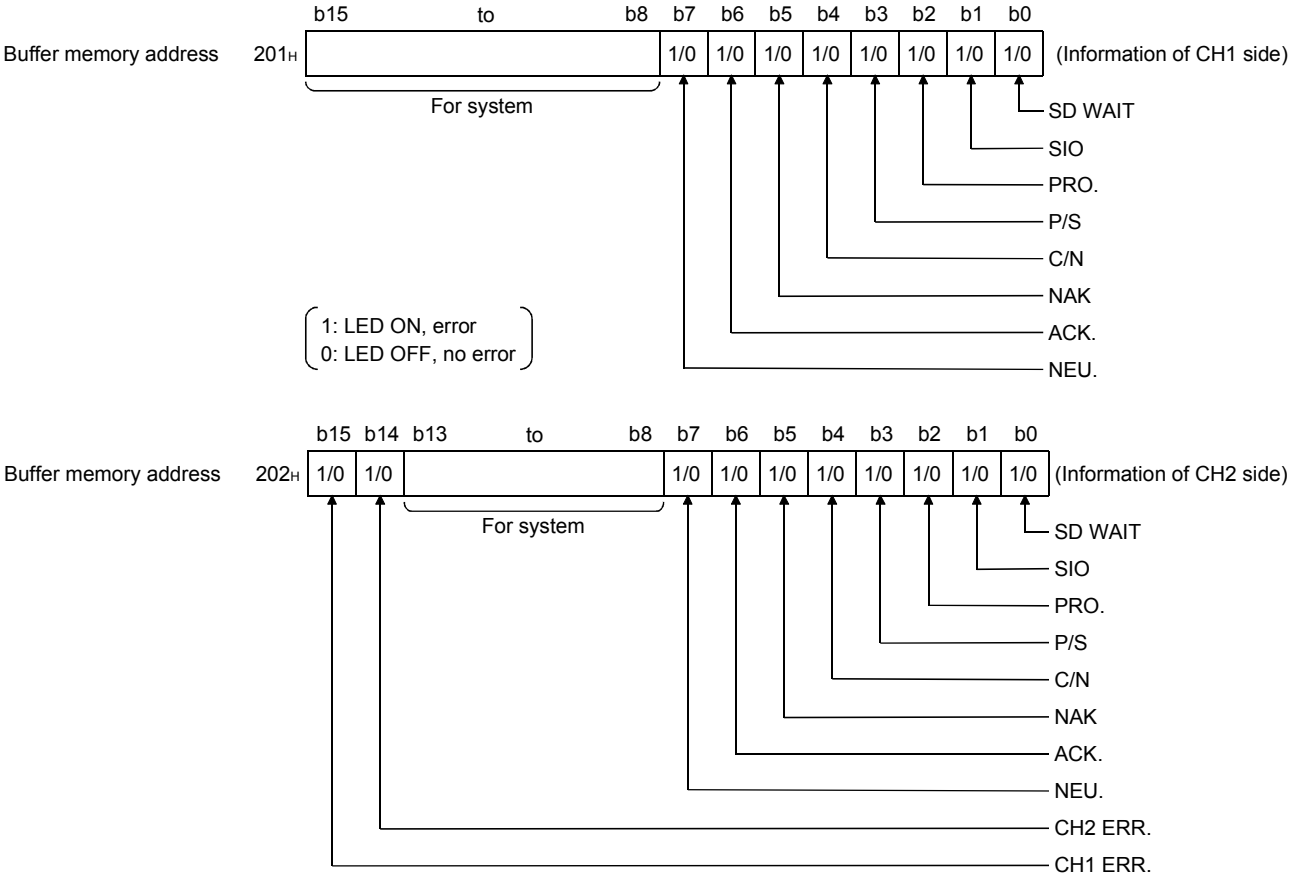
GX Developer → [Diagnostics] → [System monitor] →
Module's Detailed Information → H/W Information



[Displays]

1) H/W LED Information Right side (Left side: CH1 information/
Right side: CH2 information)

Displays the transmission status and the communications error status of the Q series C24.
(Displays 201H/202H of the buffer memory.)



2) H/W SW Information Parameter

The switch information of the Q series C24 is displayed.
Numbers 1 through 5 correspond to switches 1 through 5 shown in Section 4.5.2.
(See Section 4.5.2.)

(3) Checking by GX Configurator-SC

Have the "Monitor/test others" screen displayed.
For displaying the screen, see Section 9.6.10 of the User's Manual (Basic).

(4) LED ON status and communications error status

No.	Status signal name	Description	Description when ON (when LED is turned on (1))	Description when OFF (when LED is turned off (0))	Initial state	Related protocol			
						MC	Non procedure	Bidirectional protocol	Pre-defined
1	SD WAIT	Transmission wait status	Waiting for data transmission	Data transmission start	OFF	○			
2	SIO	SIO error status	Overrun or framing error occurred.	Normal	OFF	○			
			OS area is full. ＊ Received data was deleted.		OFF	—	○		
3	PRO.	Character error status	Error occurred.	Normal	OFF	○	—		
4	P/S	Status of parity error or sum check error	Error occurred.	Normal	OFF	○			
5	C/N	Access status with the programmable controller CPU	(＊1)	Normal	OFF	○	—		
6	NAK	Abnormal completion status	Abnormal completion transmission	Normal completion transmission	OFF				
7	ACK.	Normal completion status	Normal completion transmission	Abnormal completion transmission	OFF				
8	NEU.	Neutral status ＊ Waiting to receive command	Neutral	Command reception	(＊2)				
9	CH2. ERR	Error occurrence status on CH2 side	Switch setting error Mode switching error Transmission error Reception error On-demand error Flash ROM write error Flash ROM write count over limit error	Normal	OFF	○			
10	CH1. ERR	Error occurrence status on CH1 side			OFF				

＊1 C/N turns on in the following cases:

- An external device issued a data read request to the programmable controller CPU when write during RUN is set to prohibit in the switch settings by GX Developer (see Section 4.5.2).
  ＊ For functions that cannot be used when write during RUN is set to prohibit, see the explanation section in each command list of the Reference Manual.
- When an error has occurred during access between the Q series C24 and the programmable controller CPU.

＊2 NEU. is valid when a target interface is set to use the MC protocol.
When the target interface is set to other than the MC protocol, the status of NEU. is off.

(a) When a communication error occurs, take corrective action according to Section 11.3.

(b) The initial status of the LED ON and communications error indicates the status when the Q series C24 starts up by turning on the power or resetting the programmable controller CPU.

(c) Each of the communications error status, C/N to SIO, CH1 ERR. and CH2 ERR., turns on when an error occurs, and keeps its on-status even after the communication returns to normal.
The programmable controller CPU can check the aforementioned LED ON status and communications error status, and initialize any error information using read/write to the buffer memory of the Q series C24 and input/output signals.
Initialize the error information according to Section 11.1.2.

(d) NAK to NEU. (No. 6 to 8) turn on/off depending on the status.

(e) SD WAIT turns on when data cannot be sent to the external device by the transmission control of the Q series C24 (waiting for data transmission).
- When transmission cannot be started.
- When a transmission pause request is received during data transmission. (DR(DSR) signal is off, reception by DC3)
  SD WAIT turns off when transmission becomes possible and data transmission is started/resumed.

11.1.2 Initializing error information of the serial communication module

This section explains the ERR. LED ON factors and the error code initialization (clear) for the Q series C24.

(1) ERR. LED ON factors

When any of the following errors occurs, its error code is stored in the buffer memory corresponding to the interface (CH) where the error occurred, and the ERR. LED turns on.

Cause of error	Error code storage buffer memory			Applicable protocol			
	Address		Name	MC	Non-procedure	Bidirectional protocol	Pre-defined
	CH1	CH2					
Switch setting error Mode switching error	203H		Switch setting error and mode switching error status	○	○	○	○
On-demand execution error	256H	266H	On-demand execution result	○	×	×	×
Data transmission error	257H	267H	Data transmission result	○	○	○	○
Data reception error	258H	268H	Data reception result	○	○	○	○
MC protocol transmission error	25AH	26AH	MC protocol transmission error code	○	×	×	×
Monitoring device error	2205H	2305H	Programmable controller CPU monitoring function execution result	○	○	○	×
Pre-defined protocol function error	4042H	4052H	Pre-defined protocol function error code	×	×	×	○

(2) Turning off the ERR. LED and initializing the error codes by GX Configurator-SC (Refer to Section 9.6.11)

(a) When turning off the ERR. LED and initializing the error codes
By making the CH□ ERR. clear request on the "Monitor/Test" screen, the ERR. LED of the Q series C24 turns off and the stored error codes are initialized.

(b) When initializing the communication error information
By making the CH□ LED off, Communication error clear request on the "Monitor/test others" screen, the LEDs (ERR., NEU.) of the Q series C24 turn off and the communication error information is initialized.

(3) Turning off the ERR. LED and initializing the error codes by sequence program

(a) Input signals used to notify of error occurrences and output signals used to initialize the error code

I/O signal		Item	Description/function
Input signal	XE	CH1 ERR. occurrence	Turns on upon error occurrence in CH1 interface.
	XF	CH2 ERR. occurrence	Turns on upon error occurrence in CH2 interface.
Output signal	YE	CH1 ERR. clear request	Turns on when initializing error code of interface on CH1 side.
	YF	CH2 ERR. clear request	Turns on when initializing error code of interface on CH2 side.

* Initialization of error code is continuously performed when ERR. clear request (YE/YF) is on.

POINT

The CHn side error information can be initialized by the LED off, Communication error clear request (address: 0H/1H). By using the ERR. clear request (YE/YF), the error codes stored in the above buffer memory can further be initialized (cleared). However, protocol execution logs are not cleared even if the ERR. clear request (YE/YF) is used.

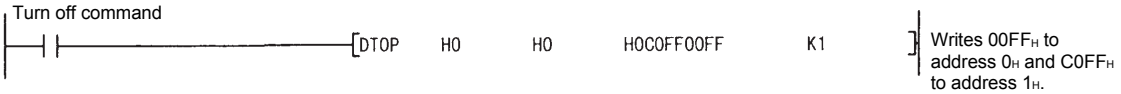
(b) Initializing communication error information by writing
Communication error information can be initialized by writing "1" to the corresponding bit in the communication error clear request and to turn LED off (address: 0H/1H).

＊ The displayed LEDs and communication error information may be turned on/off in the following cases:
- NEU. to NAK turn on/off depending on the status.
- C/N to SIO turn on when errors occur and keep the ON-status even after the operation returns to normal.

1) Communication error clear request and to turn LED off (address: 0H/1H)
The contents of the error information corresponding to each bit in this request area are the same as those for the LED ON status and communication error status (address: 201H/202H).
For more details, see Section 11.1.1 (1).
The following describes the correspondence between the LED OFF request areas and the LED ON status storage areas:
- Communication error clear request for CH1 and to turn LED off (address: 0H) → LED ON status and communication error status on CH1 side (address: 201H)
- Communication error clear request for CH2 and to turn LED off (address: 1H) → LED ON status and communication error status on CH2 side (address: 202H)

2) Example of a program for turning off displayed LEDs
The following shows an example of a program that issues an initialization request for all the communication error information of CH1 and CH2.
(Input/output signals X/Y00 to X/Y1F of QC24)

● Example of TO instruction



POINT

(1) Initialization requests are valid only when write operation is performed.
The initialization requests clear all data in the LED ON status and communication error status (address: 201H/202H) at the same time.
Furthermore, when initialization of error information on the CH1 and CH2 sides is requested, ERR. occurrence (XE/XF) also turns off.

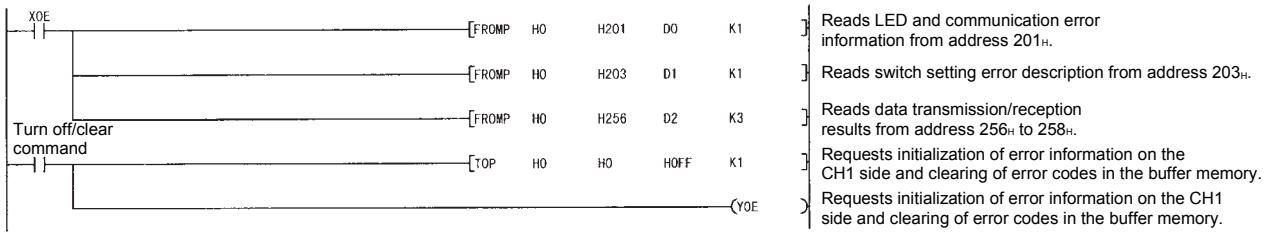
(2) Data written to the communication error clear request and to turn LED off (address: 0H/1H) is cleared after initialization processing.

(3) If errors persist even after completion of the initialization processing, the corresponding communication error information is stored again and the corresponding bit in the LED ON status and communication error status (address: 201H/202H) turns on (1).

(c) Examples of programs that initialize displayed LED and communication error information

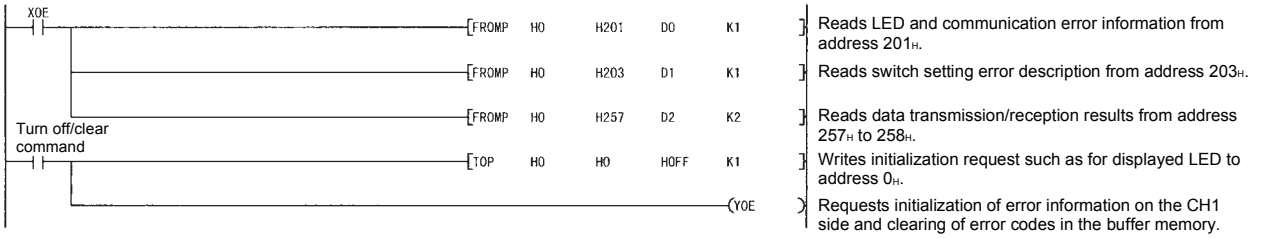
The following shows examples of a program that reads error codes when errors described in (1) above occur in an interface on the CH1 side and initializes the displayed LED and communication error information.
Incorporate the necessary part of the program.
(Input/output signals X/Y00 to X/Y1F of the Q series C24)

1) When data is communicated using the MC protocol


X0E
FROMP H0 H201 D0 K1
FROMP H0 H203 D1 K1
FROMP H0 H256 D2 K3
Turn off/clear command
TOP H0 H0 H0FF K1
Y0E
Reads LED and communication error information from address 201H.
Reads switch setting error description from address 203H.
Reads data transmission/reception results from address 256H to 258H.
Requests initialization of error information on the CH1 side and clearing of error codes in the buffer memory.
Requests initialization of error information on the CH1 side and clearing of error codes in the buffer memory.

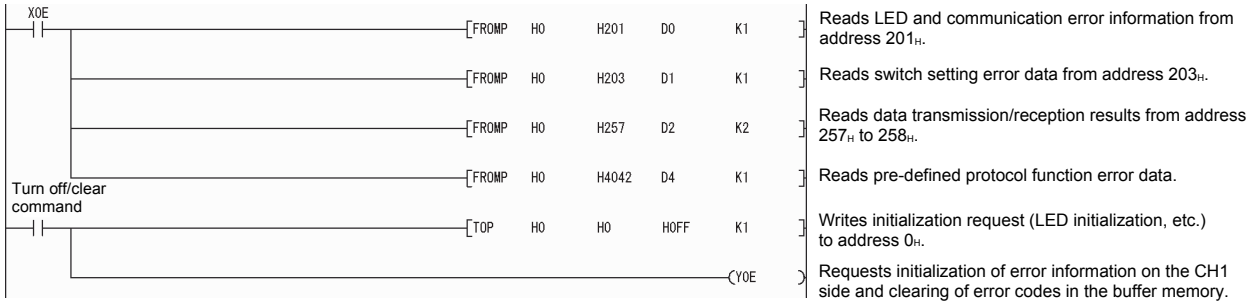
Check the error codes and take corrective action according to Section 11.2.

2) When data is communicated using the non procedure or bidirectional protocol


X0E
FROMP H0 H201 D0 K1
FROMP H0 H203 D1 K1
FROMP H0 H257 D2 K2
Turn off/clear command
TOP H0 H0 H0FF K1
Y0E
Reads LED and communication error information from address 201H.
Reads switch setting error description from address 203H.
Reads data transmission/reception results from address 257H to 258H.
Writes initialization request such as for displayed LED to address 0H.
Requests initialization of error information on the CH1 side and clearing of error codes in the buffer memory.

Check the error codes and take corrective action according to Section 11.2.

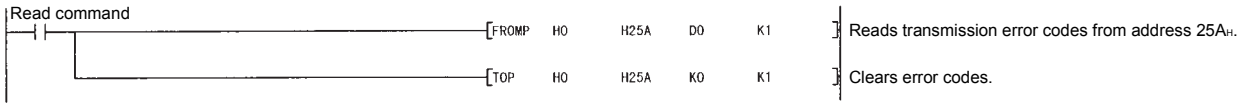
3) When data is communicated using the pre-defined protocol


X0E
FROMP H0 H201 D0 K1
FROMP H0 H203 D1 K1
FROMP H0 H257 D2 K2
FROMP H0 H4042 D4 K1
Turn off/clear command
TOP H0 H0 H0FF K1
Y0E
Reads LED and communication error information from address 201H.
Reads switch setting error data from address 203H.
Reads data transmission/reception results from address 257H to 258H.
Reads pre-defined protocol function error data.
Writes initialization request (LED initialization, etc.) to address 0H.
Requests initialization of error information on the CH1 side and clearing of error codes in the buffer memory.

Check the error codes and take corrective action according to Section 11.2.

REMARKS

When data is communicated using the MC protocol, the displayed ERR. LED may not be turned on if the Q series C24 sends an NAK message to the external device in response to the command message.
Error codes (see Section 11.2) corresponding to the error content when the NAK message is sent back to the external device are stored in the following areas. (When communicating with an A compatible 1C frame, the error codes differ from the transmission error code.)
To check error codes transmitted by the programmable controller CPU, incorporate the following program (in case of the interface on the CH1 side).



Check the error codes and take corrective action according to Section 11.2.

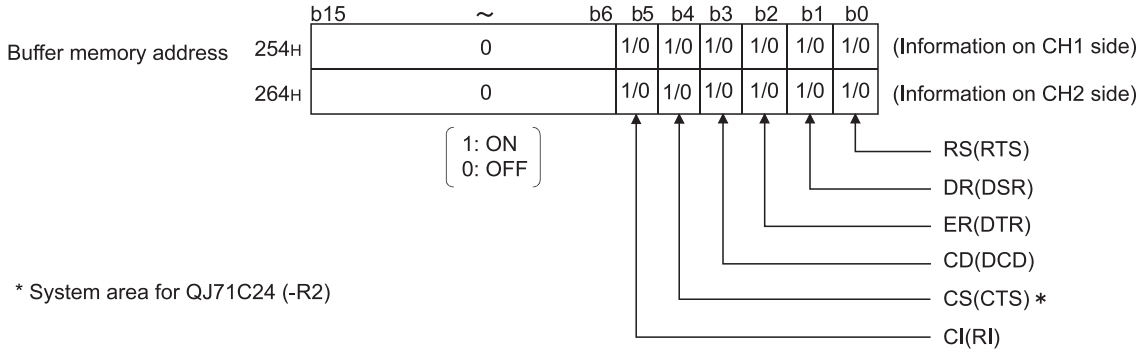
11.1.3 Reading the RS-232 control signal status

This section explains how to read the control signal status stored in the buffer memory during communication using RS-232 interface.
When GX Configurator-SC is used, check the status using the "Transmission control and others monitor/test" screen (see Section 9.6.3).

When a transmission problem occurs, read operation is executed to check the signal on/off status of the RS-232 interface.

(1) RS-232 control signal status (address: 254H/264H)

The status of the RS-232 signals is stored as follows:


b15 ~ b6 b5 b4 b3 b2 b1 b0
Buffer memory address
254H 0 1/0 1/0 1/0 1/0 1/0 1/0 (Information on CH1 side)
264H 0 1/0 1/0 1/0 1/0 1/0 1/0 (Information on CH2 side)
1: ON
0: OFF
RS(RTS)
DR(DSR)
ER(DTR)
CD(DCD)
CS(CTS) *
CI(RI)
* System area for QJ71C24 (-R2)

REMARKS

(1) For more details on signals for RS-232, see Section 3.2.1.

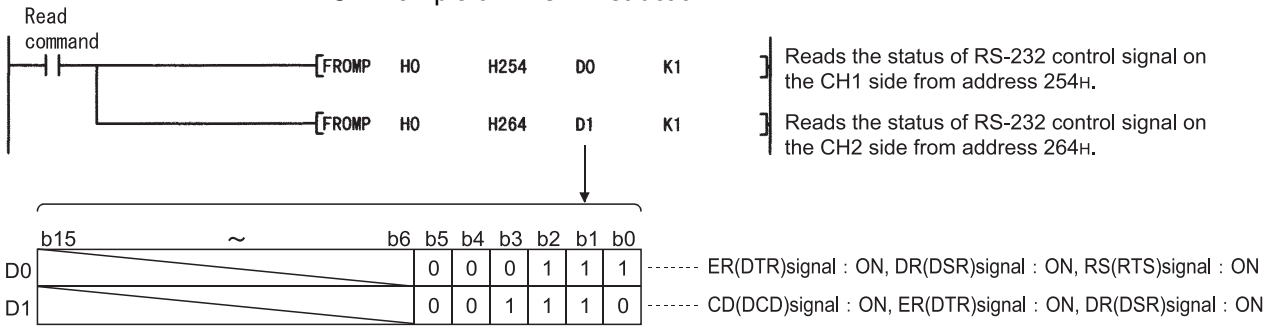
(2) Signals output from the Q series C24 side (RS(RTS) and ER(DTR)) are controlled by the operating system (OS) of the Q series C24.
They cannot be directly controlled by the sequence program.

(3) There is a maximum delay of 100 ms in signal status stored in the buffer memory above.

(2) Example of a program that reads from RS-232 control signal status (address: 254H/264H)

The following shows an example of a program that reads the RS-232 control signal status.
(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction


Read command
FROMP H0 H254 D0 K1
FROMP H0 H264 D1 K1
Reads the status of RS-232 control signal on the CH1 side from address 254H.
Reads the status of RS-232 control signal on the CH2 side from address 264H.
b15 ~ b6 b5 b4 b3 b2 b1 b0
D0 0 0 0 1 1 1
ER(DTR)signal : ON, DR(DSR)signal : ON, RS(RTS)signal : ON
D1 0 0 1 1 1 0
CD(DCD)signal : ON, ER(DTR)signal : ON, DR(DSR)signal : ON

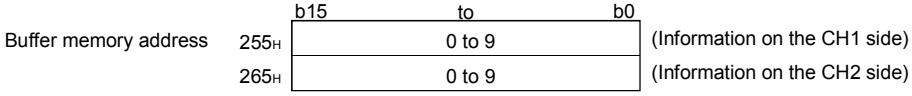
11.1.4 Reading the data communication status (Transmission sequence status)

This section explains how to read the current status of the data communication using the MC protocol stored in the buffer memory.
When GX Configurator-SC is used, check the status using the "MC protocol monitor" screen (see Section 9.6.4).

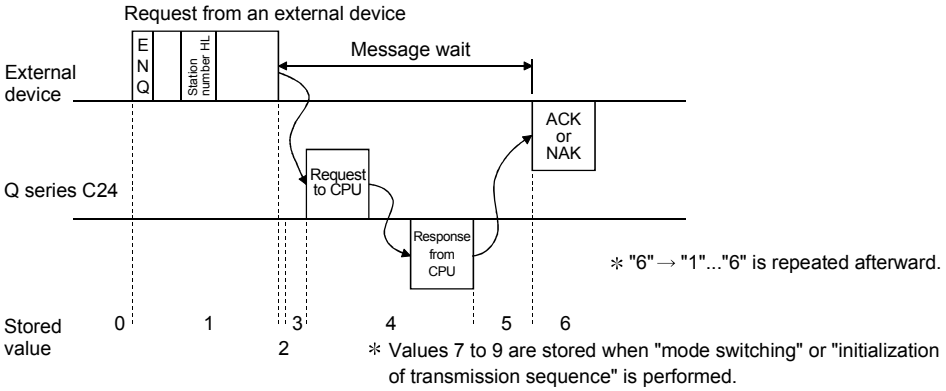
When a transmission problem occurs, read operation is executed to check the status of the data communication using the MC protocol.

(1) Transmission sequence status (address: 255H/265H)

The status of data communication using MC protocol is stored as a numerical value as shown below.



The following shows the correspondence between the numerical values in the transmission sequence status storage area and the data communication status.



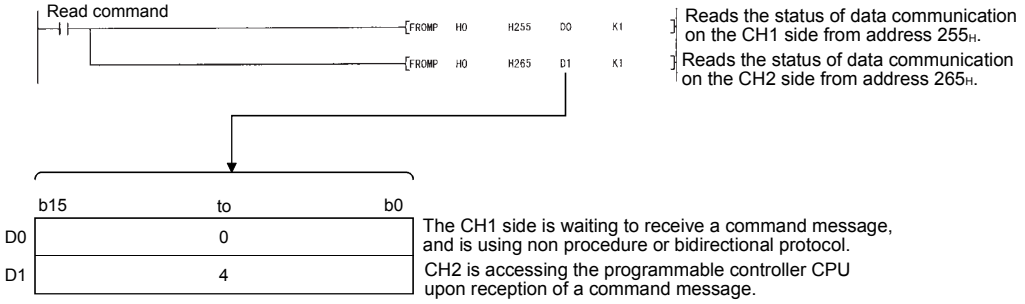
REMARKS

When the target interface is not set to use the MC protocol, "0" is stored in the transmission sequence status (address: 255H/265H).

(2) Example of a program that reads from transmission sequence status (address: 255H/265H)

The following shows an example of a program that reads from the transmission sequence status.
(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction


Read command
FROMP H0 H255 D0 K1
Reads the status of data communication on the CH1 side from address 255H.
FROMP H0 H265 D1 K1
Reads the status of data communication on the CH2 side from address 265H.
b15
to
b0
D0
0
The CH1 side is waiting to receive a command message, and is using non procedure or bidirectional protocol.
D1
4
CH2 is accessing the programmable controller CPU upon reception of a command message.

11.1.5 Reading the switch setting status

This section explains how to read the switch setting status of the Q series C24.
When GX Configurator-SC is used, check the status in the "Monitor/test others" screen (see Section 9.6.10).

REMARKS

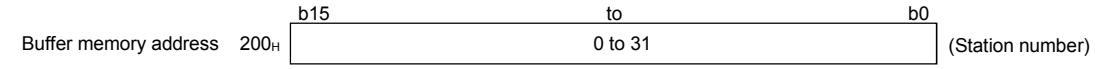
(1) The switch settings can be changed when the mode is switched or when the UINI instruction is executed. (The station No. setting can be changed only when the UINI instruction is executed.)
For the mode switching, refer to the User's Manual (Application).
For the UINI instruction, refer to the User's Manual (Application).

(2) For the switch settings, refer to Section 4.5.

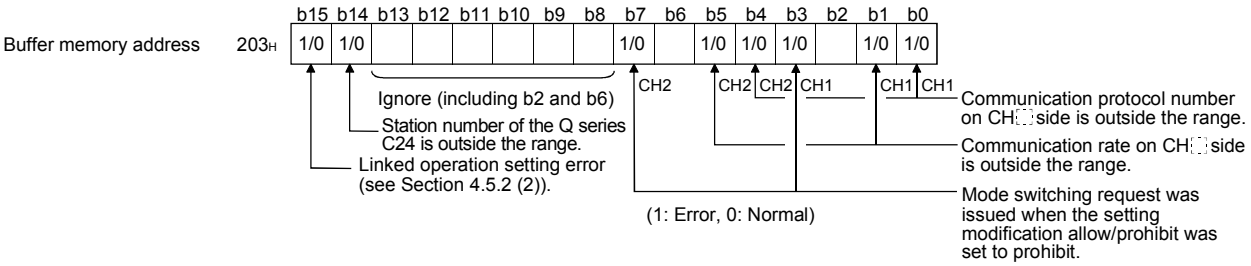
(1) Setting status storage area

The switch settings by GX Developer and setting error information are stored in different areas of the buffer memory shown below.

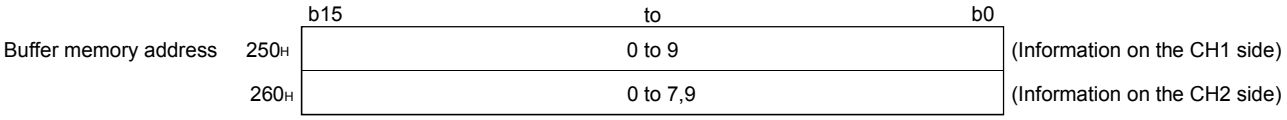
1) Station No. (switch setting) (address: 200H)



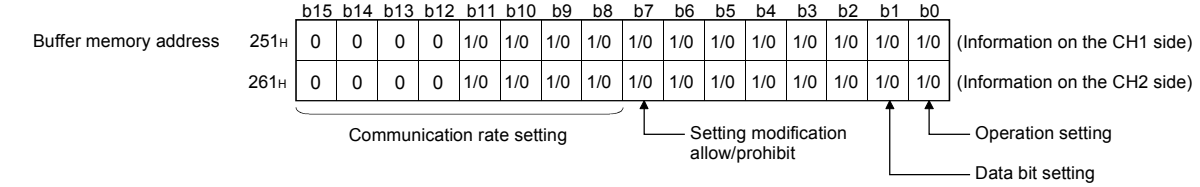
2) Switch setting error and mode switching error status (address: 203H)


b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
Buffer memory address
203H
1/0 1/0 1/0 1/0
Ignore (including b2 and b6)
Station number of the Q series C24 is outside the range.
Linked operation setting error (see Section 4.5.2 (2)).
CH2
CH2 CH2
CH1
CH1 CH1
Communication protocol number on CH side is outside the range.
Communication rate on CH side is outside the range.
Mode switching request was issued when the setting modification allow/prohibit was set to prohibit.
(1: Error, 0: Normal)

3) Communication protocol status (address: 250H/260H)



4) Transmission setting status (address: 251H/261H)


b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
Buffer memory address
251H
261H
0 0 0 0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0
(Information on the CH1 side)
(Information on the CH2 side)
Communication rate setting
Setting modification allow/prohibit
Operation setting
Data bit setting

(2) Example of a program that reads from the setting status storage area

The following shows an example of a program that reads the setting of various switches of the Q series C24 from the setting status.

For details on ERR. occurrence (XE/XF) of the input/output signals used in the program, see Section 11.1.2 (3).

(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction


XOE
XOF
<>
K0
D0
FROMP H0 H203 D0 K1
FROMP H0 H200 D1 K1
FROMP H0 H250 D2 K2
FROMP H0 H260 D4 K2
Reads error description from address 203H.
Reads station number setting and switch setting description from address 200H.
Reads communication protocol setting and transmission setting description on the CH1 side from addresses 250H to 251H.
Reads communication protocol setting and transmission setting description on CH2 from addresses 260H to 261H.

Restarts the Q series C24 after checking the error code and resetting switches.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
D0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Error description (1: Communication protocol number setting error)
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Setting station number of the Q series C24 (0).
D2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	CH1 side: Communication protocol setting number (9).
D3	0	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	CH1 side: (transmission setting description)
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	CH2 side: Communication protocol setting number (1).
D5	0	0	0	0	0	1	0	1	0	1	1	0	1	0	1	0	CH2 side: (transmission setting description)

Displays communication protocol number setting error status on the CH1 side

11.1.6 How to read the current operation status

This section explains how to read the current operation status of the Q series C24. When GX Configurator-SC is used, check the status in the "Transmission control and others monitor/test" screen (see Section 9.6.3).

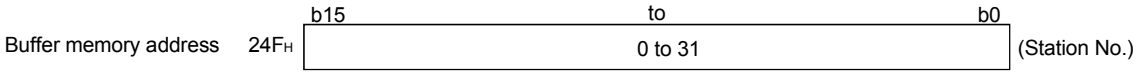
REMARKS

- The status of the switch settings by GX Developer can be checked by performing read operations as described in Section 11.1.5.
- Refer to Section 4.5 for the switch settings.

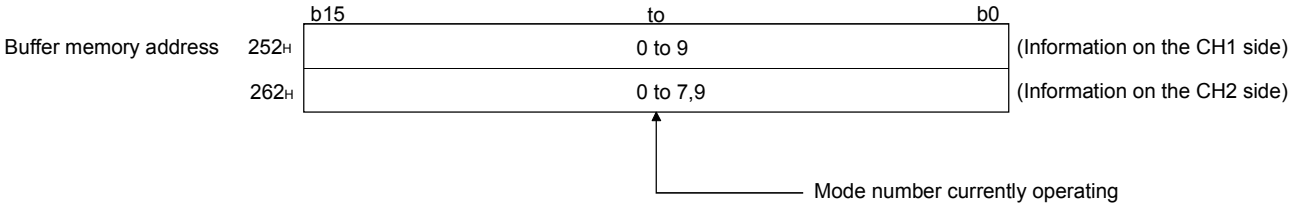
(1) Operation mode status storage area

The current operation status of the Q series C24 is stored into the following buffer memory areas.

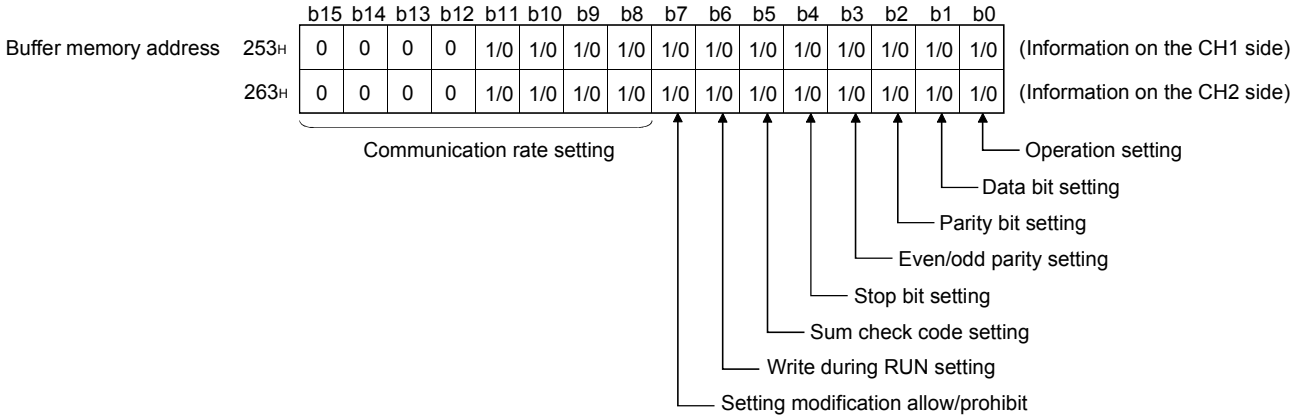
1) Station No. (instruction setting) (address: 24F$_H$)



2) Communication protocol status (address: 252$_H$/262$_H$)



3) Transmission status (address : 253$_H$/263$_H$)


b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
Buffer memory address
253$_H$
0 0 0 0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0
(Information on the CH1 side)
263$_H$
0 0 0 0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0 1/0
(Information on the CH2 side)
Communication rate setting
Operation setting
Data bit setting
Parity bit setting
Even/odd parity setting
Stop bit setting
Sum check code setting
Write during RUN setting
Setting modification allow/prohibit

(2) Example of a program that reads from the current setting status storage area

The following shows an example of a program that reads from the switch setting status for current operation of the Q series C24.

For details regarding ERR. occurrence (XE/XF) used in the program, see Section 11.1.2 (3).

(input/output signals X/Y00 to X/Y1F of the Q series C24)

● Example of FROM instruction


XOE
XOF
<>
K0
D0
FROMP H0 H203 D0 K1
FROMP H0 H252 D1 K2
FROMP H0 H262 D3 K2
FROMP H0 H24F D5 K1
Reads error description from address 203H.
Reads CH1 side communication protocol status and transmission status from addresses 252H to 253H.
Reads CH2 side communication protocol status and transmission status from addresses 262H to 263H.
Reads station No. from address 24FH.

After checking error codes and changed setting values, designate the correct setting values and switch mode.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
D0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Communication protocol Error description (2: Communication rate error)
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	CH1 side: Setting communication protocol number 6 (transmission setting description)
D2	0	0	0	0	1	1	1	1	0	0	0	0	1	0	1	0	
D3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	CH2 side: Setting communication protocol number 1 (transmission setting description)
D4	0	0	0	0	0	1	0	1	0	1	1	0	1	0	1	0	
D5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Station No. 1 being set.

While the CH1 side is set to the non procedure protocol and the CH2 side is set to the MC protocol (format 1), this indicates the communication rate setting error on the CH1 side.

11.1.7 Clearing the programmable controller CPU information

This section explains how to clear the programmable controller CPU information.

(1) Programmable controller CPU information

(a) This is information about the access target CPU type used in MC protocol communications.
The Q series C24 obtains this information from the access target CPU at the time of initial access, and stores it inside the Q series C24.
Since access is made based on this information, the processing speed will be increased from the second access.

(b) The programmable controller CPU information is cleared in the following cases:
- When the programmable controller is powered OFF and then ON, or when the CPU module is reset
- When the programmable controller CPU information clear request is executed

(2) If the programmable controller CPU information has not been correctly obtained

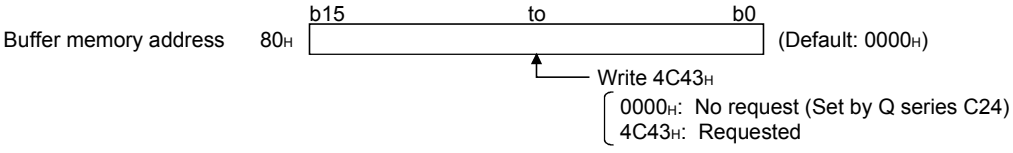
Problems including the following may occur:
- Accessible device range is narrowed. (Error code: 7140H)
- Some of commands and/or devices cannot be used. (Error code: 7142H, 714DH)

In the above case, execute the programmable controller CPU information clear request.

POINT
If initial access is made at startup of the access target CPU or while the network is unstable, the programmable controller CPU information may not be correctly acquired.

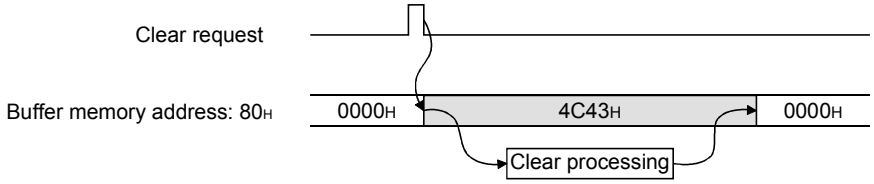
(3) Operation of the programmable controller CPU information clear request

(a) Write "4C43H" to the programmable controller CPU information clear request (address: 80H). (Set by the user)



(b) The programmable controller CPU information clear processing of the Q series C24 is executed. ＊1

(c) Upon completion of the clear processing, "0000H" is written to the programmable controller CPU information clear request (address: 80H). (Set by the Q series C24)



＊1 The transmission sequence status (address: 255H/265H) is also initialized.

(4) Executing the programmable controller CPU information clear request

(a) Executing from GX Developer

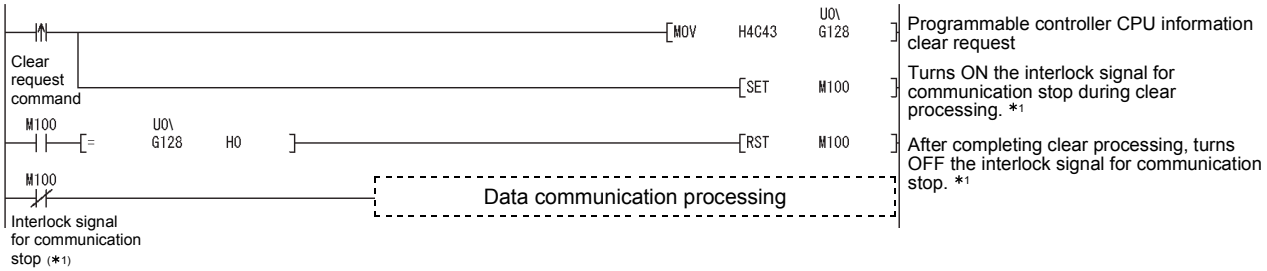
1) On the Device test screen, set "4C43H" to buffer memory address 80H.
2) On the Buffer Memory Batch monitor screen, check that the value in buffer memory address 80H is "0000H".

(b) Executing from GX Configurator-SC

1) Select "Requested" for the PLC CPU information clear request on the monitor/test others screen, and click Execute test.
2) Confirm that the present value for the PLC CPU information clear request is "No request".

(c) Executing from sequence program

In the following program, turning on the clear request command clears the programmable controller CPU information of the Q series C24 that is mounted in the position corresponding to I/O signal X/Y00 to X/Y1F.


Clear request command
MOV H4C43 U0\G128
Programmable controller CPU information clear request
SET M100
Turns ON the interlock signal for communication stop during clear processing. *1
M100 U0\G128 H0
RST M100
After completing clear processing, turns OFF the interlock signal for communication stop. *1
M100
Data communication processing
Interlock signal for communication stop (*1)

*1 Create a program in which data communication processing will not be performed while the interlock signal for communication stop (M100) is ON.

(5) Precautions

(a) Execute the programmable controller CPU information clear after communication with the external device is stopped.
And, do not perform communication with the external device during the programmable controller CPU information clear processing. (If any data are received from the external device during the clear processing, the data will be discarded.)

(b) When a modem is connected, cut off the line linked with the external device before executing the programmable controller CPU information clear. (The line is cut off at execution of the programmable controller CPU information clear.)

(c) Do not execute the UINI instruction during the programmable controller CPU information clear.
If the programmable controller CPU information clear is attempted during execution of the UINI instruction, the clear processing will be executed after completion of the UINI instruction.

11.2 Error Code Tables

The following shows the error codes, error contents, and corrective action for errors that are generated during communication between the Q series C24 and an external device.
The signal name in the following table indicates the CH□ side LED on status or communication error status that is stored into buffer memory address 201H/202H when an error occurs.
The CH□ side LED on status and communication error status can be confirmed by GX Developer's System monitor or GX Configurator-SC. (Refer to Section 11.1.1.)
For errors without a corresponding signal name entered to errors generated with the MC protocol communication, "NAK" comes on.

11.2.1 Error code table

The following table lists the error codes, error details, and corrective actions for the errors that may occur during communication using MC protocol (excluding A compatible 1C frame), non procedure protocol, bidirectional protocol, or pre-defined protocol.
(The error codes with a mark ＊ in the table are those for when the target CPU is not a Q/QnACPU.)

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Proce-dure	Bidire-ctional	Pre-defined
3E8H to 3FFFH	—	(Error detected by the CPU)	—	• Refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection) and take corrective action.	○			
4000H to 4FFFH	—	(Error detected by the CPU)	—	• Refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection) and take corrective action. • If this error occurs during CPRTCL instruction execution, identify the CPU error, and correct the CPU device No. that is specified in the Non-conversion or Conversion variable data storage area.	○			○
7101H 7102H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7103H	Programmable controller access error	• Cannot communicate with the Q series C24 CPU.	C/N	• Make the watchdog timer (timer 1) time longer. • Perform a self-loopback test, and check if the CPU can communicate.	○			
7104H to 7116H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7140H ＊	Request data error	• Number of request points exceeds the range for the command. • A word device was designated in a bit units command. • The last device No. exceeds the range. (Given device last No. ≧ Designated head device No. + Designated number of points)	PRO	• Check and correct the external device transmit message and restart data communications. • If no error is found in the device range, clear the programmable controller CPU information and retry. (Refer to Section 11.1.7.)	○			
7141H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7142H ＊	Device name error	• A device that cannot be designated by the given command was designated.	PRO	• Check and correct the external device transmit message and restart data communications. • If no error is found in the device name, clear the programmable controller CPU information and retry. (Refer to Section 11.1.7.)	○			

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7143H ＊	Device No. error	• The head device No. is out of range.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7144H ＊	Monitor data write error	• Monitoring was requested before the device to be monitored was written.	PRO	• Write the device to be monitored before issuing a monitor request.	○			
7145H ＊	Monitor PC No. error	• The written PC No. and PC No. in the monitor request are different.	C/N	• Rewrite the monitor data.	○			
7146H ＊	Monitor CPU model name error	• The written CPU model name and the CPU monitor name in the monitor request are different.	C/N	• Rewrite the monitor data.	○			
7147H ＊	Written number of monitoring points overrun error	• The written number of monitoring points exceeds the designated range.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7148H ＊	Extension R block No. error	• A nonexistent extension file register block No. was designated. • A block No. being used as an extension comment area, sampling trace area, or status latch area was designated.	PRO	• Correct the designated block No. and restart data communications.	○			
7149H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
714AH ＊	Cannot execute a command during RUN	• A write command was designated when "Disable write during RUN" was set. • Parameter or sequence program was written during RUN.	C/N	• Change the setting to "Enable write during RUN" and restart data communications. • Stop the CPU and restart data communications.	○			
714BH 714CH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
714DH	Unusable command error	• An unusable command is issued to the access target CPU.	C/N	• Check and correct the external device transmit message and restart data communications. • If no error is found in the command, clear the programmable controller CPU information and retry. (Refer to Section 11.1.7.)	○			
714EH ＊	Monitor network No. error	• The written monitor network No. and the monitor request network No. are different.	C/N	• Check and correct the other station access valid module No. in the network parameters. • Rewrite the monitor data.	○			
7150H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7151H	PC No. designation error	• A PC No. other than "FF" or "0 to 120 (00H to 78H)" was designated.	C/N	• Check and correct the external device transmit message and restart data communications.	○			
7152H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7153H	Frame length error	• The received message length has exceeded the allowable range.	CHn ERR.	• Review the transmission message. • Correct the message format so the number of access points is within the allowable range.	○			
7154H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7155H	Unwritten monitor data error	• Monitoring was requested before monitor data was written.	PRO	• Write the device to be monitored before issuing a monitor request.	○			
7156H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7160H	Programmable controller access error	• CPU model name cannot be confirmed.	C/N	• If there is an error in the CPU, remove the CPU error and restart data communications.	○			
7161H to 7163H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7164H	Request error	• Either the request or the device designation method is wrong.	—	• Check the transmission message/request from the external device, make the necessary corrections, and send again.	○			
7166H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7167H	Cannot execute a command during RUN	• A write command was designated when "Disable write during RUN" was set.	C/N	• Change the setting to "Enable write during RUN" and restart data communications.	○			
7168H		• A command that cannot be executed during RUN was designated.	C/N	• Stop the CPU and restart data communications.				
7169H	CPU error	• Cannot communicate normally with the CPU.	C/N	• If there is an error in the CPU, remove the CPU error and restart data communications.	○			
716AH to 716BH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
716CH	System error	• The Q series C24 used is not compatible with the Built-in Ethernet port QCPU.	—	• To use a Built-in Ethernet port QCPU, use a Q series C24 of function version B or later, and the first 5 digits of its serial No. must be 10042 or greater.				
		• The OS of the Q series C24 detected some error.		(＊1)				
716DH	Monitor data write error	• Monitor data was not written using QnA compatible 2C/3C/4C frame.	PRO	• Rewrite monitor data.	○			
716EH		• Monitor data was not written using A compatible 1C frame.	PRO					
716FH	Device error	• A nonexistent device was designated. • Device that cannot be specified by the corresponding command was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7170H	A compatible 1C frame error	• Number of access points exceeded the range.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7171H		• A device that cannot be designated was designated.	PRO		○			
7172H		• Written number of monitoring points is incorrect. For example, [0] was designated.	PRO		○	○	○	
7173H	Monitor data write error	• Monitor data was written for a CPU other than a Q/QnACPU using QnA compatible 2C/3C/4C frame.	PRO	• Write the monitor data and use the A compatible 1C frame to a CPU other than a Q/QnACPU.	○			
7D00H	Protocol No. setting error	• In control data of the CPRTCL instruction, the specified protocol No. is out of range.	CHn ERR.	• Correct the protocol No. setting.				○
7D01H	Continuous protocol execution count setting error	• The number of protocols to be executed continuously, which is specified with an argument in the CPRTCL instruction, is out of range.	CHn ERR.	• Correct the value set for the number of protocols to be executed continuously.				○
7D02H	Protocol not-ready error	• The protocol was executed while Pre-defined protocol ready (X1D) is OFF. • The CPRTCL instruction was executed during protocol setting data writing. • The CPRTCL instruction was executed with abnormal protocol setting data.	CHn ERR.	• Confirm Pre-defined protocol ready (X1D) turned ON before executing the CPRTCL instruction. • To prevent concurrent execution of the CPRTCL instruction, set the CPU to STOP before writing the protocol setting data. • Write the protocol setting data again to the Q series C24N, and then execute the CPRTCL instruction. • If this error persists even after rewriting, replace the module.				○

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7D10H	Protocol unregistered error	• The protocol No. specified in control data for the CPRTCL instruction is not registered to the Q series C24N. • The CPRTCL instruction was executed with no protocol setting data written.	CHn ERR.	• Check if the specified protocol No. is correct. • Check the Protocol registration area (buffer memory: 4091H to 4098H) to see if the specified protocol No. is registered. • Write the protocol setting data from GX Configurator-SC, and then execute the CPRTCL instruction.				○
7D12H	Transmission monitoring timeout error	• Transmission monitoring time has timed out. Although the transmission was retried the specified number of times, it did not succeed.	CHn ERR.	• Check if the transmission is interrupted due to some reason such as DTR control. • Check if the CS signal is ON. • Check the cables for disconnection.				○
7D13H	Receive wait timeout error	• Receive wait time has timed out.	CHn ERR.	• Check if the reception is interrupted due to some reason such as DTR control. • Check the cables for disconnection. • Check the sending device for an error. • Using the circuit trace function (communication data monitoring function), check if: 1) Transmissions from external devices are interrupted. 2) Any data are missing due to a receive error. 3) An error exists in the data (packet) sent from the other device.				○
7D14H	CPU response monitoring timeout error	• CPU response monitoring time has timed out during transmission. Data to be sent to the device could not be acquired from the CPU within the set time.	CHn ERR.	• Increase the Response monitoring time (timer 1) value. (Default: 5 seconds) • If an error has occurred in the CPU, refer to the QCPU (Q mode) User's Manual (Maintenance and Inspection), and take corrective actions.				○
7D15H	CPU response monitoring timeout error	• CPU response monitoring time has timed out during reception. Data received from the device could not be stored into the CPU within the set time.	CHn ERR.	• Increase the Response monitoring time (timer 1) value. (Default: 5 seconds) • If an error has occurred in the CPU, refer to the QCPU (Q mode) User's Manual (Maintenance and Inspection), and take corrective actions.				○
7D16H	Protocol cancel request error	• A cancel request was accepted during protocol execution, and the CPRTCL instruction failed. • The CPRTCL instruction failed because protocol setting data were written during CPRTCL instruction execution.	CHn ERR.	• Check the cancelled protocol in the CPRTCL instruction's control data (execution count result), and eliminate the cause of the cancellation. • If necessary, clear the error information by error clear request (YE/YF). • To prevent concurrent execution of the CPRTCL instruction, set the CPU to STOP before writing the protocol setting data.				○
7D17H	Packet size error	• A packet of more than 2048 bytes was received.	CHn ERR.	• Check the data length of the packet sent from the device. • Divide the packet data into several parts and send them separately.				○
7D18H	Too few digits error	• When data are received by the protocol including a packet that contains a conversion variable (variable number of data), the number of digits corresponding to the variable is insufficient.	CHn ERR.	• Correct the data sent from the device. • If the protocol was edited in GX Configurator-SC (Pre-defined protocol support function), check the packet format of the external device to see if the number of digits is set correctly.				○

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7D19H	Invalid number of digits error	• When data are received by the protocol including a packet that contains a conversion variable (variable number of data and variable number of digits), the corresponding data is 0 bytes (0 digits) or exceeds the maximum number of digits.	CHn ERR.	• Correct the data sent from the device. • If the protocol was edited in GX Configurator-SC (Pre-defined protocol support function), check the packet format of the external device to see if the number of digits is set correctly.				○
7D1AH	Data length error	• In the data received from the external device, the Length value does not match the data length of the conversion variable(s).	CHn ERR.	• Check the data sent from the external device to see if: (1) The Length value is correct or not. (2) Any of the data corresponding to the conversion variable is missing or not. • If GX Configurator-SC (Pre-defined protocol support function) was used for protocol editing, check the sender's packet format to see if an incorrect value is set for the conversion variable.				○
7D1BH	Value range error	• When the protocol used for data reception includes a packet that contains a conversion variable, a value of the data for the conversion variable exceeds the range allowed for the Q series C24N.	CHn ERR.	• Check the data sent from the external device. • If GX Configurator-SC (Pre-defined protocol support function) was used for protocol editing, check the sender's packet format to see if an incorrect value is set for the conversion size. (1) If it exceeds the range for word data, change the conversion size setting to Double word. (2) If it exceeds the range for double-word data, change the element to Non-conversion variable.				○
7D20H	Data length setting error, data quantity setting error	• The value set in the data length storage area or the data quantity storage area is out of range.	CHn ERR.	• Check the maximum allowable data length, and specify the maximum length or less in the data length storage area. • Check the maximum allowable data quantity, and specify the maximum quantity or less in the data quantity storage area.				○
7D21H	Decimal point position error	• An out-of-range value is set for the decimal point position when the number of decimals is set to Variable. • The number of decimals is larger than the number of digits for each data.	CHn ERR.	• Correct the value set for the decimal point position. • Check the number of digits setting, and set the decimal point position so that the number of decimals is less than the number of digits.				○
7E00H to 7E05H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E06H	Buffer memory address setting error	• Transmit/receive buffer memory addresses are in the special applications area.	—	• Change the buffer memory addresses so that they are outside the special applications area.				
7E07H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E08H	Currently inexecutable error	• The UINI instruction was executed during programmable controller CPU information clear.	—	• Execute the UINI instruction while the programmable controller CPU information clear is not executed.	○	○	○	○
7E09H 7E0AH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E40H	Command error	• A nonexistent command or subcommand was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7E41H	Data length error	• A data length exceeding the number of points that can communicate during random read/write was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○			

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7E42H	Error count error	• Number of requested points exceeds the range for the command.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
	Protocol setting data write error	• Protocol setting data were written to the Q series C24 that does not support the pre-defined protocol communication.		• To use the pre-defined protocol function, use a supported Q series C24N. (Use the QJ71C24N(-R2/4) whose first 5 digits of serial No. is 10122 or higher.)				○
7E43H	Device error	• A nonexistent device was designated. • Device that cannot be specified by the corresponding command was designated. • The head device No. is out of range.	PRO	• Check and correct the external device transmit message and restart data communications.	○	○		
7E44H	Timer 1 time-out error	• A response message was not returned within the response monitoring time (timer 1) monitoring time.	C/N	• Make the timer 1 monitoring time longer. • When accessing another station's CPU, check if the routing parameters match.	○			
7E46H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E47H	Continuous request error	• The next request was received before a response message was returned for the preceding request.	PRO	• Do not issue continuous requests from the external device. • Set the timer 1 monitoring time to the external device time-out time.	○			
7E48H to 7E4CH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E4DH	Error during data transmission	• Mode switching was executed during data transmission.	CHn ERR.	• Make arrangements between the target device and programmable controller CPU so that mode switching is not executed during data transmission.	○	○		
7E4EH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E4FH	Device point count error	• Access point count is incorrect.	PRO	• Check and correct the external device transmit message and restart data communications.	○	○		
7E50H	User frame No. designation error	• A user frame No. outside the range was designated.	PRO	• Check and correct the external device transmit message and restart data communications. • Recheck the frame No..	○	○		
7E51H	Unwritten user frame error	• An unwritten user frame No. was designated.	PRO	• Write the frame beforehand. • Change the frame No. and restart data communications. • Recheck the frame No..	○	○		
7E52H	User frame overwrite error	• A written frame No. overwrite request was issued.	PRO	• Change the write destination to an unwritten frame No. • When overwriting, delete the given No. beforehand.	○			
7E53H	User frame access data error	• A nonexistent command was designated in a subcommand. • Byte count exceeding the number of bytes that can be requested was designated.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7E54H	Modification allowed error	• Flash ROM write allow/prohibit designation from GX Configurator-SC is set to OFF. • At the switch setting on GX Developer, modification allowed switch was set to OFF.	PRO	• Set to ON at GX Configurator-SC. • Set to ON at GX Developer.	○	○	○	○
7E55H	User frame data error	• There is an error in the user frame variable data.	PRO	• Check and correct the external device transmit message and restart data communications.	○	○		
7E56H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7E57H	Flash ROM write error	• Cannot write to Flash ROM normally. • Power is turned off during writing to Flash ROM.	— CHn ERR.	• Re-execute the write operation. If the error is generated again, replace the module.	○	○	○	○
7E58H	Mode modification error	• There was an error in the mode No. or transmission specification designated contents when changing the mode.	PRO	• Check and correct the contents of the external device transmit message and restart data communications. • Recheck the switch setting on the Q series C24.	○	○	○	○
7E59H	Flash ROM write count over limit error	• Writing to flash ROM was performed 1000 times after power-on. • Writing to flash ROM was performed 100,000 times.	— CHn ERR.	• Review the program. • Reset the Flash ROM write count (address: 2401H) to 0 and restart data communications. • When the number of writes reached 100,000, replace the module.	○	○	○	○
7E5EH	Programmable controller CPU monitoring function registration error	• The programmable controller CPU monitoring function is registered for the communication protocol that does not support the function.	CHn ERR.	• Correct the communication protocol setting value.			○	○
7E5FH	I/O number error on requested module	• I/O number of requested module is incorrect.	—	• Correct the I/O number of the module to which data is sent.	○	○		
7E60H	Device monitoring duplicate registration error	• Programmable controller CPU monitoring registration was performed twice.	—	• Cancel the programmable controller CPU monitoring and perform the programmable controller CPU monitoring registration again.	○	○		
7E61H	Cycle time units range error	• Setting value of cycle time units is out of range.	—	• Correct the setting value of the cycle time units.	○	○		
7E62H	Programmable controller CPU monitoring function error	• Setting value of programmable controller CPU monitoring function is out of range.	—	• Correct the setting value of the programmable controller CPU monitoring function.	○	○		
7E63H	Transmission measure setting error	• Setting of transmission measure of the programmable controller CPU monitoring is incorrect.	—	• Correct the setting value of the transmission measure.	○	○		
7E64H	Registration point range error	• Registration point (word/bit) is out of range.	—	• Correct the setting value of the registration point (word/byte)	○	○		
7E65H	Programmable controller CPU abnormal monitoring number error	• Setting value of the programmable controller CPU abnormal monitoring is out of range.	—	• Correct the setting value of the programmable controller CPU abnormal monitoring.	○	○		
7E66H	Monitoring condition error of monitoring device	• Setting value of transmission condition is out of range.	—	• Correct the setting value of the transmission condition.	○	○		
7E67H	CPU abnormal monitoring setting value error	• Setting value (fixed value) of CPU abnormal monitoring is out of range.	—	• Correct the setting value (fixed value) of the CPU abnormal monitoring.	○	○		
7E68H	Transmission condition range error of monitoring device	• Setting value of transmission condition (condition agreement transmission) is out of range.	—	• Correct the setting value of the transmission condition (condition agreement transmission).	○	○		
7E69H	CPU abnormal monitoring setting value error	• Setting value (fixed value) of CPU abnormal monitoring is out of range.	—	• Correct the setting value (fixed value) of the CPU abnormal monitoring.	○	○		
7E6AH	Monitoring device read point range error	• Read point of monitoring device is out of range.	—	• Correct the setting value of the read point of the monitoring device.	○	○		
7E6BH	CPU abnormal monitoring setting value error	• Setting value (fixed value) of CPU abnormal monitoring is out of range.	—	• Correct the setting value (fixed value) of the CPU abnormal monitoring.	○	○		
7E6CH			—		○	○		
7E6DH			—		○	○		
7E6EH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7E6FH	Modem connection error	• Modem is connected to an incorrect channel.	—	• Correct the CH to which notification is sent.	○	○		

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7E70H	CPU error	• The communication with the CPU could not be performed normally.	C/N	• If there is an error in the CPU, eliminate the error on the CPU side and communicate again.	○	○		○
7E73H to 7E8EH 7EC1H 7EC2H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7EC3H	Double send request error	• A send request was performed while another send request was being processed.	—	• Interlock (handshake) the send requests.		○	○	
7EC4H	Transmission data count error Transmission/ receipt buffer setting error	• Data larger than the transmit buffer size was transmitted. • Transmission/receipt buffer settings out of range.	—	• Make the transmission data count smaller than the transmit buffer size. • Make the non procedure protocol transmit buffer size larger. • Designate the first address and size of transmission/receipt buffer in the free area range of the user.	○	○	○	
7EC5H	Flash ROM access error	• Write to Flash ROM was requested when the setting modification enable/disable switch in GX Developer was set to OFF.	—	• When writing to Flash ROM, set switch shown left of the given interface to ON and restart the Q series C24.	○	○	○	○
7EC6H	Flash ROM access error	• There is an error in the Flash ROM read/write request contents.	—	• Check the read/write request data and designate the correct data.	○	○	○	○
7F00H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7F01H	Buffer full error	• The next data was received before processing of the previous data was completed.	—	• Increase the transmission time by performing handshake with the external device, etc.	○	○	○	○
		• Multiple requests was simultaneously issued for one channel.		• Perform handshake with the request source external device.	○	○	○	○
7F02H to 7F06H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7F20H	ASCII → BIN conversion error	• An ASCII code that cannot be converted to binary code was received.	PRO	• Check and correct the external device transmit message and restart data communications.		○	○	
		• An odd number of bytes of data was received during data communications using ASCII ← → BIN conversion.		• When data are converted between ASCII and binary, always transmit data in units of even bytes.				
		• When data are received by the protocol including a packet that contains a conversion variable, the data corresponding to the conversion variable cannot be converted to binary numbers. • When data are received by the protocol including a packet that contains an error check code (ASCII hexadecimal or ASCII decimal), the data corresponding to the error check code cannot be converted to binary numbers.		• Confirm the message sent from the external device, correct it, and restart the communication. • If GX Configurator-SC (Pre-defined protocol support function) was used for protocol editing, check the sender's packet format to see if an incorrect value is set for Conversion, Sign character, Number of decimals, Delimiter, or number of digits of the conversion variable. • If GX Configurator-SC (Pre-defined protocol support function) was used for protocol editing, check the sender's packet format to see if an incorrect value is set for Code type or Data length of the check code.				○
7F21H	Receive header area error	• There is an error in the command (frame) part.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
		• An ASCII code that cannot be converted to binary code was received.						
7F22H	Command error	• A nonexistent command or device was designated. • The remote password length is wrong.	PRO	• Check and correct the external device transmit message and restart data communications.	○			

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7F23H	MC protocol message error	• There is no data (ETX, CR-LF, etc.) following the character area, or designation was incorrect.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
7F24H	Sum check error	• The sum check code calculated does not match the sum check code received. • The horizontal parity code calculated does not match the horizontal parity code received. • The calculated error check code does not match the received error check code.	P/S	• Check the sum check code of the external device. • Check the horizontal parity code calculated of the external device. • Check CRC-16 of the external device. • If GX Configurator-SC (Pre-defined protocol support function) was used for protocol editing, check the sender's packet format to see if an incorrect value is set for Processing method, Code type, Data length, Data flow, Complement calculation, or Calculating range of the check code.	○	○		○
7F25H	Data length error	• The length of the received data exceeds the receive area size.	CHn ERR.	• Correct the "data length" that is transmitted from the external device. • Change the "word/byte units" set by the Q series C24 to byte units. • Increase the receiving area of the Q series C24.			○	
7F26H	Command error	• Another command was received before an unlock processing while the remote password is registered.	CHn ERR.	• Perform the communication after the unlock processing is normally completed.	○			
7F30H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7F31H	Simultaneous transmission error	• The Q series C24 and an external device started transmitting simultaneously.	—	• Process by agreement with the external device. • When necessary, change the simultaneous transmission data valid/invalid designation setting by GX Configurator-SC. (address: 9BH/13BH)			○	
7F32H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7F40H	Time-out error	• No reception watchdog timer (timer 0) time-out occurred.	PRO	• Check if data was dropped from the receive data. • Check if DTR control, etc. interrupted reception.	○	○	○	
7F41H		• Response watchdog timer (timer 1) time-out occurred.	—	• Check the status of the message transmission destination and restart data communications, as required.	○		○	
7F42H		• Transmit watchdog timer (timer 2) time-out occurred.	—	• Check if DTR control, etc. interrupted transmission.	○	○	○	
7F50H to 7F54H 7F60H to 7F66H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7F67H	Overrun error	• The Q series C24 received the next data before it completed receive processing of the previous data.	SIO	• Decrease the data transmission rate and restart data communications. • Check whether a temporary stop has occurred in the station in which the Q series C24 is installed. (For the QCPU this can be checked using special register SD1005.) If a temporary stop has occurred, remove its cause.	○	○	○	○

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Proce-dure	Bidire-ctional	Pre-defined
7F68H	Framing error	• Data does not match the stop bit setting. • A malfunction occurred in the network because the power source of the partner station was on or off. • Noise occurs in the network. • When the multidrop was connected, data was transmitted simultaneously by multiple devices.	SIO	• Match the Q series C24 and external device settings. • Clear the error information according to the ERR. clear request (YE/YF). In addition, when communicating data with the non procedure protocol, execute the INPUT instruction, and read and discard the unnecessary data. • Measure the noise. • When connecting the multidrop, remove the interlock so that data will not be transmitted simultaneously by multiple devices.	○	○	○	○
7F69H	Parity error	• Data does not match the parity bit setting. • A malfunction occurred in the network because the power source of the partner station was on or off. • Noise occurs in the network. • When the multidrop was connected, data was transmitted simultaneously by multiple devices.	P/S	• Match the Q series C24 and external device settings. • Clear the error information according to the ERR. clear request (YE/YF). In addition, when communicating data with the non procedure protocol, execute the INPUT instruction, and read and discard the unnecessary data. • Measure the noise. • When connecting the multidrop, remove the interlock so that data will not be transmitted simultaneously by multiple devices.	○	○	○	○
7F6AH	Buffer full error	• OS receive buffer overflowed and receive data was skipped.	SIO	• Use DTR and DC control and perform data communications so that the buffer does not become full. (Perform RS · CS control when the modem function is used.) • If the Read Request signal was turned ON, execute read immediately.	○	○	○	○
7F6BH	CD(DCD) signal control error	• Data was received when CD(DCD) signal is OFF when "CD terminal check enabled" was designated.	CHn ERR.	• Recheck the CD(DCD) signal control of the external device. (Send while the CD(DCD) signal is ON.) • Set "no CD terminal checking" and perform communication.	○	○	○	○
7F6CH	Transmission error	• Data cannot be sent because the line is not connected.	CHn ERR.	• Transmit data after line connection processing on the interface side that uses the modem function.	○	○	○	

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Procedure	Bidirectional	Predefined
7F91H to 7F96H 7F98H to 7F9AH 7F9DH 7F9EH 7FA0H to 7FA3H 7FA8H 7FAAH to 7FADH 7FAFH to 7FB2H 7FB5H 7FB6H 7FB8H to 7FBCH 7FC0H to 7FC4H	System error	• The OS of the Q series C24 detected some error.	—	(*1)				
7FC8H	Protocol setting data error	• There is an error in the protocol setting that was edited in GX Configurator-SC (Pre-defined protocol support function). • The protocol setting data written to the Q series C24N includes unsupported function data. • The protocol setting data written to the Q series C24N is corrupted.	CHn ERR.	• Identify the incorrectly edited protocol in Protocol setting data error information (buffer memory: 4086H to 4089H), correct the setting data, and write them again to the Q series C24N. • Check the version of the Q series C24N to confirm the supported functions. Use the pre-defined protocol function within the range of supported functions. • Write the protocol setting data again to the Q series C24N, and execute the CPRTCL instruction. • If this error persists even after rewriting, replace the module.				○
7FC9H to 7FCFH	System error	• The OS of the Q series C24 detected some error.	—	(*1)				
7FD0H to 7FE5H	Refer to the error code list for use of the modem function, and take corrective action. (Refer to Section 11.2.3.)							
7FE6H	Processing disabled	• Remote passwords do not match.	—	• Check the remote password and communicate again.	○			
7FE7H		• The remote password is not registered. • The remote password processing command was received on the interface side where the modem function is not used. • The GX Developer connection is selected in the communication protocol setting on the corresponding CH.	CHn ERR.	• A remote password processing command is not necessary when a remote password is not registered. • Perform a remote password unlock processing through GX Developer. Alternatively, change the communication protocol setting of the corresponding CH to the MC protocol.	○			
7FE8H		• The number of remote password disagreements exceeded the value designated at the address 200DH.	CHn ERR.	• Clear the storage area of the accumulated count of unlock process abnormal completion processing (address: 22FCH) to 0.	○			
7FE9H	Refer to the error code list for use of the modem function, and take corrective action. (Refer to Section 11.2.3.)							
7FEFH	Switch setting error	• There is an error in the switch setting by the GX Developer	CHn ERR.	• Write CPU to the parameter and reboot after correcting the setting value for the switch.	○	○	○	○

Error code (Hexa-decimal)	Error	Description	Signal name	Corrective action	Protocol			
					MC	Non Proce-dure	Bidire-ctional	Pre-defined
7FF0H	Dedicated instructions simultaneous execution error	• Executed dedicated instructions simultaneously.	—	• Do not use dedicated instructions simultaneously.	○	○	○	○
7FF1H	Control data error	• Setting value is incorrect. • Setting value is out of range.	—	• Correct the setting value in the control data.	○	○		
7FF2H	Communication protocol setting error	• Instruction cannot be executed with the current communication protocol.	—	• Correct the setting value of the communication protocol.	○	○		○
7FF3H to 7FF4H	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
7FF5H	Processing cancelled due to mode switching, transmission sequence initialization, etc.	• The processing in operation was cancelled due to execution of the following: <Mode switching, transmission sequence initialization, reception data clear (by buffer memory), user frame use enable/disable designation, UINI instruction, programmable controller CPU information clear>	—	• Do not execute these functions during any other processing.	○	○	○	○
7FF7H	Simultaneous access error	• Multiple external devices accessed a remote station on the same network at the same time.	—	• Multiple external devices must not access a remote station on the same network at the same time.	○			
7FF8H to 7FFFH	System error	• The OS of the Q series C24 detected some error.	—	(＊1)				
B000H to BFFFH	—	• Errors detected by the CC-Link module	—	• Take corrective action by referring to the CC-Link Master/Local Module User's Manual.	○			
C000H to CFFFH	—	• Errors detected by the Ethernet module	—	• Take corrective action by referring to the Ethernet Interface Module User's Manual.	○			
D000H to DFFFH	—	• Errors detected by the CC-Link IE Field Network module	—	• Take corrective action by referring to CC-Link IE Field Network User's Manual.	○			
E000H to EFFFH	—	• Errors detected by the CC-Link IE Controller Network module	—	• Take corrective action by referring to CC-Link IE Controller Network Reference Manual.	○			
F000H to FFFFH	—	• Errors detected by the MELSECNET/H, MELSECNET/10 network system	—	• Take corrective action by referring to MELSECNET/H, MELSECNET/10 network system reference manual.	○			

＊1 Take corrective action in the following procedure.

1) Check whether the Q series C24, power supply module and CPU module are mounted correctly on the base unit.
2) Check whether the operating environment of the Q series C24 is within the general specifications range of the CPU module.
3) Check whether the power supply capacity is sufficient or not.
4) Check whether the hardware of the Q series C24, CPU module and base unit are normal according to the manuals of the corresponding modules.
   If any module is faulty, please contact your local Mitsubishi service center or representative for repair.
5) If the problem cannot be solved through the above steps, please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

11.2.2 A compatible 1C frame communications error code table

The following table lists the error code, error contents, and corrective action for errors generated during A compatible 1C frame communications.

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Protocol			
					MC	Non Proce-dure	Bidire-ctional	Pre-defined
00H	Disable during RUN	• A write command was designated when "Disable write during RUN" was set. • Parameter or sequence program was written during RUN.	C/N	• Change the setting to "Enable write during RUN" and restart data communications. • Stop the CPU and restart data communications.	○			
01H	Parity error	• The data does not match the parity bit setting.	P/S	• Match the Q series C24 and external device settings.	○			
02H	Sum check error	• The sum check calculated by the Q series C24 and the transmitted sum check are not the same.	P/S	• Check the external device sum check.	○			
03H	Protocol error	• Received message that is different from the control procedure with the communication protocol setting.	PRO	• Check and correct the external device transmit message and restart data communications.	○			
04H	Framing error	• The data does not match the stop bit setting.	SIO	• Match the Q series C24 and external device settings.	○			
05H	Overrun error	• The next data was received before the Q series C24 received all the preceding data.	SIO	• Decrease the transmission rate and restart data communications.	○			
06H	Character area error	• Designation method error in part of a message. • A command that does not exist was designated. • The number of processing points is outside the range for the command. • A device that does not exist was designated.	PRO	• Check and correct the external device transmit message and restart data transmission.	○			
07H	Character error	• Received data that cannot be used.	PRO		○			
08H	Programmable controller access error	• The CPU cannot communicate with the Q series C24.	C/N	• Replace the CPU with a CPU that can communicate with the Q series C24.	○			
10H	PC No. error	• The PC No. is not "FF", or a station No. set in the network parameters.	C/N	• Check and correct the external device transmit message and restart data communications.	○			
11H	Mode error	• An error was detected upon access to the programmable controller CPU.	—	• Send again. • Conduct individual station recovery test and check the Q series C24.	○			
12H	Special function module designation error	• A special function module does not exist at the specified position.	C/N	• Check and correct the external device transmit message and restart data communications.	○			
21H	Special function module bus error	• An error was detected upon access to a special function module at the specified position.	C/N	• Check the error and take corrective action according to the manual of the corresponding module.	○			
42H	Other errors	* See POINT .			○			

POINT

- If an error occurs during A compatible 1C frame communications, the Q series C24 adds a 2-character error code (00_H to 10_H, 42_H) to the "NAK" code and returns the "NAK" code to the external device and stores the error code (equivalent to QnA compatible 2C/3C/4C frame error code) to buffer memory address $25A_H$ (CH1) or $26A_H$ (CH2).
  The exact error contents can be checked by reading the value stored to the buffer memory.
  See Section 11.2.1 for a detailed description of the error codes.

11.2.3 Error code list while modem function is used

The following table lists the error codes, contents and corrective actions for errors (including errors at the abnormal completion) that may occur while the Q series C24 modem function is used.
The error codes for the modem function are stored in the modem function error code (address : 221H(545)).

* The reference pages listed in the table below are found in the User's Manual (Application).

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Reference section
7FD0H	Modern function error	There is an error in the designation of the notification execution.	CHn ERR.	Set 0 to 1 to the notification execution designation.	Section 3.3.6
7FD1H		There is an error in the designation of the number of connection retries.		Set the number of connection retries in the range of 1 to 5.	
7FD2H		There is an error in the designation of the connection retry interval.		Set the connection retry interval in the range of 90 to 300 (s).	
7FD3H		There is an error in the initialization/connection time-out designation.		Set the initialization/connection time- out in the range of 1 to 60 (s).	
7FD4H		There is an error in the designation of the number of initialization retries.		Set the number of initialization retries in the range of 1 to 5.	
7FD5H		There is an error in the designation of the data number for initialization.		Designate the registered data number for initialization, or 0.	Section 3.3.6 Section 3.4.5
7FD6H		There is an error in the data for connection designated by the data number for connection.		Recheck the pager receiver designation.	Section 3.4.4
7FD7H				Recheck the dialing number of the external line.	
7FD8H	System error	The OS of the Q series C24 detected some error.	—	(* 1)	—
7FD9H	Modern function error	External destination is connected to network or modem has not been initialized.	CHn ERR.	After the modem has been initialized, connect to the network if the external destination is not connected to the network or report it.	Section 3.4.6 Section 3.4.7
7FDAH		There is an error in the designation of the data number for connection.		Designate a registered number for the data for connection.	Section 3.3.6 Section 3.4.6
7FDBH		There is an error in the designation of the GX Developer connection.		Set 0 to 1 to the GX Developer connection designation.	Section 3.3.6
7FDCH		There is an error in the data for connection designated by the data number for connection.		Recheck the waiting time for the notification-message part of the message transmission.	Section 3.4.4
7FDDH		A connection time-out error occurred.		• Recheck the telephone number in the data for connection. • Check if the destination is ready for a connection. • Recheck the set value of the connection time-out. • Recheck the initialization command.	Section 3.3.6 Section 3.4.3 Section 3.4.4
7FDEH		Connection to the modem/TA was unsuccessful, or the modem/TA is not connected.		• Check if there is any problem with the modem/TA by seeing the operation manual of the modem/TA. • Connect the modem/TA to the Q series C24. • Check the connection cable by seeing the operation manual of the modem/TA. • Check if the Q series C24 is faulty or not, talking the procedure shown under * 1.	—
7FDFH		Modem connection channel number is not designated.	—	Set 1 to 2 to the modem connection channel designation.	Section 3.3.6
7FE0H		Designated value of modem connection channel is incorrect.			

Error code (Hexa-decimal)	Error	Error Contents	Signal name	Corrective action	Reference section
7FE1H	Modern function error	There is an error in the designation of the user frame number.	CHn ERR.	• Recheck the user frame number. • Designate the registered user frame number. • Register the designated data for initialization.	Section 3.4.3 Section 3.4.4 Section 3.4.5
		There is an error in the designation of the output head pointer.		• Designate the output head pointer in the range of 1 to 100. • Designate the position (n-th position) where the data for initialization number is designated. • Designate the data for initialization number at the designated position (n-th position).	Section 3.4.5
7FE2H		There is an error in the designation of the output frame number.		Designate a registered data for initialization number within the range of the designated number of outputs from the location of the output head pointer.	
7FE3H		There is an error in the designation of the number of registered data bytes.		• Designate the data for initialization in the range of 1 to 78. • Designate 80 for the data for connection.	Section 3.4.3 Section 3.4.4
7FE4H		There is an error in the data for connection.		• Recheck the message length of the message for notification.	Section 3.4.4
7FE5H		There is an error in the designation of the no-communication interval time.		• Designate the no-communication interval time in the range of 0 to 120.	Section 3.3.6
7FE8H		The number of remote password mismatch exceeded the value designated at the address 200DH.		• Clear the Accumulated count of unlock process abnormal completion processing (address: 22FCH) to 0.	Section 3.3.3
7FE9H		Callback denial exceeded the value designated at the address 2002H		• Clear the callback denial accumulated count (address: 22F1H) to 0.	Section 3.3.4

∗1 Take corrective action in the following procedure.

1) Check whether the Q series C24, power supply module and CPU module are mounted correctly on the base unit.
2) Check whether the operating environment of the Q series C24 is within the general specifications range of the CPU module.
3) Check whether the power supply capacity is sufficient or not.
4) Check whether the hardware of the Q series C24, CPU module and base unit are normal according to the manuals of the corresponding modules.
   If any module is faulty, please contact your local Mitsubishi service center or representative for repair.
5) If the problem cannot be solved through the above steps, please consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

11.3 Troubleshooting by Symptom

The following table lists the troubleshooting of trouble generated during communications between the Q series C24 and external device according to the trouble symptom.
When trouble occurs, first confirm the status of the Q series C24 and check the relevant item in the table below.

Symptom	Symptom description	Protocol				Reference section
		Dedicated	Non procedure	Bidirectional	Pre-defined	
LED turns on/off (check according to Section 4.3)	• "RUN" LED turned off.	○	○	○	○	Section 11.3.1
	• "RD" does not blink even through an external device is transmitting a message.	○	○	○	○	Section 11.3.2
	• An external device transmitted a message and "RD" blinked, but the Q series C24 did not return a response message.	○		○		Section 11.3.3
	• "SD" does not blink even after a send request was made.	○	○	○	○	Section 11.3.4
	• An external device transmitted a message and "RD" blinked, but the Q series C24 did not turn ON the read request.		○	○		Section 11.3.5
	• The CPRTCL instruction is not completed even though "RD" was blinking.				○	Section 11.3.6
	• ERR. LED turns on.	○	○	○	○	Section 11.3.22
Communication errors occurred (check according to Section 11.1.1)	• The "NAK" was turned ON.	○				Section 11.3.7
	• The "C/N" was turned ON.	○	○	○	○	Section 11.3.8
	• The "P/S" was turned ON.	○	○	○	○	Section 11.3.9
	• The "PRO" was turned ON.	○				Section 11.3.10
	• The "SIO" was turned ON.	○	○	○	○	Section 11.3.11
	• The "CH1. ERR. " or "CH2. ERR. " was turned ON.	○	○	○	○	Section 11.3.12
	• Communications are intermittently established and lost.	○	○	○	○	Section 11.3.13
	• Data that cannot be decoded was transmitted and received.	○	○	○	○	Section 11.3.14
	• Whether the cause of the communications error is in the Q series C24 or the external device is unknown.	○	○	○	○	Section 11.3.15
Cannot communicate via modem (＊1)	• Cannot communicate via modem.	○	○	○		Section 11.3.16
	• Cannot communicate with ISDN sub-address.	○	○			Section 11.3.17
The programmable controller CPU monitoring function does not operate in the designated cycle time.	• Does not operate in the cycle time designated in the constant cycle transmission setting.	○	○			Section 11.3.18
	• Does not operate in the cycle time designated in condition agreement transmission setting.	○	○			Section 11.3.19
Cannot receive by an interrupt program	• Cannot receive data.		○	○		Section 11.3.20
Cannot perform initial setting	• Cannot write setting value in flash ROM of the Q series C24.	○	○	○	○	Section 11.3.21

＊1 If an error occurs while performing data exchange using the modem function described in the User's Manual (Application), first check the following items and confirm whether or not the error is caused by the modem/TA connection.
If an error relating to the modem function is occurring, perform necessary corrective actions for each cause according to the reference sections given below:
- Check the ON/OFF status of current I/O signals of the Q series C24.
- Check the storage status for error codes related to the modem function. (See Sections 11.2.3.)
- Check the ON/OFF status of the DR terminal of the modem/TA. (See the manual for the modem/TA.)

REMARKS

The following are precautionary notes when data are exchanged with an external device via one of the Q series C24 interfaces.

(1) When the power supply to the Q series C24 or external device is started, the remote device that is connected may generate a reception error.

(2) If the remote device that is connected starts up while data is being transmitted, the remote device side will generate a reception error.

(3) When the Q series C24 error LED lights up because a reception error has occurred, turn off the light if necessary in accordance with Section 11.1.
Also, if a reception error has occurred on the external device side, handle the error by seeing to the operating manual for the external device.

* Handle the occurrence of a reception error on the Q series C24 side using the following corrective actions.
  - When communicating with the MC protocol
    The Q series C24 will disregard the received data or returns a response message indicating an abnormal termination if it detects a reception error after receiving the head data of the command message in the set format.
    If the reception error is detected before the head data of the command message in the set format is received, the received data will be disregarded.
  - When communicating using non procedure protocol
    If the Q series C24 detects a reception error, the reception abnormal detection (X4/XB) turns ON.
    Perform procedures such as detection of reception error or clearing received data as required by following the explanations found in Sections 6.1.4 and 6.1.5.
  - When communicating using bidirectional protocol
    When the Q series C24 detects a reception error after the head data of a communication message for bidirectional protocol is received, it returns a response message indicating an abnormal termination.
    If the reception error is detected before the head data of the communication message for bidirectional protocol is received, the received data will be disregarded.
  - When communicating using the pre-defined protocol
    If a reception error occurs, an error code is stored in the Data reception result area (address: 258H/268H) of the Q series C24.
    Reception error codes can be also checked with the communication data monitoring function.
    Take actions such as detecting a reception error or clearing the received data, if necessary.
    For details of the communication data monitoring function, refer to the User's Manual (Application).

11.3.1 The "RUN" LED is turned OFF.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• The Q series C24 "RUN" LED turned off.	• A transmission setting switch is set to an unusable position.	• Set the switch by GX Developer correctly and after writing to the CPU reset the CPU.	○	○	○	○
	• Programmable controller CPU error.	• Remove the cause of the CPU error and reset the CPU. Note • During the Q series C24 and external device loopback test, the minimum parameters file must be written to the CPU beforehand.	○	○	○	○
	• Power module 5 V current capacity is insufficient.	• Calculate the 5 V current drain of each installed module. If the current capacity is insufficient, check power module selection. Note • Whether or not the current capacity is insufficient can be checked by disconnecting the expansion base and installing only the Q series C24 to the basic base.	○	○	○	○
	• Extraneous noise caused the Q series C24 to abnormal operation.	• Check if the shield wire is 2-point ground. • When ground is used with other devices, ground the Q series C24 independently.	○	○	○	○

11.3.2 The "RD" LED does not blink even after message transmission from the external device.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• "RD" does not blink even through an external device is transmitting a message.	• Signal lines are not connected correctly.	• Check if the Q series C24 and external RD(RXD) and SD(TXD) signal lines are cross connected. • Use the external device OPEN statement to check if the opened port and the cable connection port are matched.	○	○	○	○
	• External device transmission control signals are not turned ON.	• Connect the wiring so that the "DR(DSR)", "CS(CTS)", and other transmission control signals are ready. Note • Since the control signal specifications depend on the device, connect the wiring by seeing the instruction manual of the device used.	○	○	○	○
	• If the message passes through an RS-232 ↔ RS-422 converter, modem, etc., the signal is interrupted at one of the intervening devices.	• Check the specifications of the converter and modem and recheck the settings and wiring	○	○	○	

11.3.3 No response message is returned even though the external device transmitted a message and the "RD" LED blinked.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• An external device transmitted a message and "RD" blinked, but the Q series C24 did not return a response message. ("NEU" remains on and "SD" does not blink)	• Communication protocol is set incorrectly.	• Check if the communication protocol is set correctly. • Check if the mode was switched without using the buffer memory mode switching area. Note • The communication protocol setting contents and the communication protocol in the current operation can be checked at communication protocol status (address: 250H/260H).	○			
	• When "Check CD terminal" was set, the CD terminal was turned OFF.	• Since the message is initialized (skipped reading) when the CD terminal is turned OFF when "Check CD terminal" is set, change the wiring so that the CD terminal remains on all the time.	○		○	
	• The header byte of the message is not data needed by the set protocol and format.	• Check if the external device sent a message matched to the protocol and format. • Use the communication monitoring function to check the message from the external device. Note • The Q series C24 skips all the messages transmitted until the header byte set for each protocol and format (for example, "ENQ (05H)" for format 1) is received.	○		○	
	• The Q series C24 station No. switch setting and message station No. designation do not match.	• Check the Q series C24 station No. setting and message station No. designation. • Use the communication monitoring function to check the message from the external device. Note • When the station No. designation is local station after the header byte set for each protocol and format is received, the Q series C24 performs receive processing.	○			
	• The Q series C24 data communications monitoring time is set to "Infinite wait", or the monitoring time is too long.	• Set, or shorten, the monitoring time and retransmit the message from the external device and determine the trouble from the contents of the time-out error. Note • Error detection by watchdog timers (timer 0 to timer 2) is possible in the following cases. • When part of a message is skipped. • When transmission from an external device is interrupted. • When a link error was generated while accessing another station over a CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10. See User's Manual (Application) for a detailed description of the monitoring time.	○		○	
	• The path setting of the programmable controller CPU to be accessed is incorrect.	Check the path of the programmable controller CPU to be accessed and set the path again.	○			

11.3.4 Transmission request does not make the "SD" LED blink.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Although a transmission request was made, "SD" does not blink.	• Due to the OFF status of the CS(CTS) signal, the Q series C24 cannot transmit data to the external device.	• While the CS(CTS) signal is OFF, the Q series C24 does not transmit data to the external device. It must be ON when the external device is ready to receive data.	○	○	○	○
	• Due to transmission control (DTR or DC control), the external device cannot receive data.	• Wait until the external device is ready to receive data. • When the waiting time is too long, check the external device or cable condition.	○	○	○	○

11.3.5 Read request signal does not turn ON even though the external device transmitted a message and the "RD" LED was blinking.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• An external device transmitted a message and "RD" blinked, but the read request signal (X3/XA) was not turned ON.	• Communication protocol is set incorrect.	• Check if the communication protocol is set correctly. • Check if the mode was switched without using the buffer memory mode switching area. Note • The communication protocol setting contents and the communication protocol in the current operation can be checked at communication protocol status (address: 250H/260H).		○	○	
	• When "Check CD terminal" was set, the CD terminal was turned off.	• Since messages are skipped when the CD terminal is turned OFF when "Check CD terminal" is set, change the wiring so that the CD terminal remains on all the time.		○	○	
	• When DC control is selected, the necessary DC codes are not transmitted.	• Check if a message is transmitted without transmitting "DC1 (11H)" after the external device transmits "DC3 (13H)" during DC1/DC3 external control. • Check if the next message is transmitted without adding "DC2 (12H)" after the external device transmits "DC4 (14H)" during DC2/DC4 external control. • Use the communication monitoring function to check the message from the external device.		○	○	
	• The end code was not received, or fixed length data was not received.	• Check if the end code set at the Q series C24 and the end code transmitted from the external device are the same. • Check if the external device transmitted the fixed length designated at the Q series C24. • Check if the trailer frame was transmitted during communications by user frame. • Use the communication monitoring function to check the message from the external device. Note • When the send data from the external device is correct, take the corrective action described in Sections 11.3.10 and 11.3.11.		○	○	
	• The Q series C24 setting and message format do not match.	• The data count basics, message format, etc. depend on the following settings. • ASCII-BIN conversion enable/disable • Transparent code setting • User frame setting See the relevant section for a description of operation according to the set contents and setting of each item.		○	○	
	• The Q series C24 data communications monitoring time is set to "Infinite wait", or the monitoring time is too long.	• Set, or shorten, the monitoring time and retransmit the message from the external device and determine the trouble from the contents of the time-out error. Note • Error detection by the watchdog timer (timer 0 to timer 2) is possible in the following cases. • When part of a message is skipped. • When transmission from an external device is interrupted. See User's Manual (Application) for a detailed description of the monitoring time.		○	○	

11.3.6 The CPRTCL instruction execution is not completed although the "RD" LED blinked.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• When the CPRTCL instruction was executed for the protocol with Communication type set to "Receive only" or "Send and receive", "RD" blinked, but the instruction execution was not completed.	• Incorrect protocol No. is specified in the control data.	• Check the protocol No. specified in the control data for the CPRTCL instruction for an error.				○
	• The CD terminal is OFF when "CD terminal check enabled" is set.	• If the CD terminal is OFF with "CD terminal check enabled" set, messages will not be read. Change the wiring so that the terminal status is always ON.				○
	• The user-edited protocol setting in GX Configurator-SC (Pre-defined protocol support function) is inconsistent with the packet format of the external device.	• Check the packet format of the external device, and correct the protocol setting. (1) Check for an error in the element type or element order in the packet setting. (2) Check for an error in each element setting item (Code type, Data length, Data flow, Calculating range, etc.)				○
	• The Q series C24 has not received the expected packet.	• Using the circuit trace (the communication data monitoring function) of GX Configurator-SC (Pre-defined protocol support function), check for the data being transmitted from the external device. • When proper data are being transmitted from the external device, take action according to Section 11.3.12 or 11.3.13.				○
	• The Q series C24 has cleared the data received before the protocol execution. (In "Protocol detailed setting" of GX Configurator-SC (Pre-defined protocol support function), "Clear OS area (receive data area) before protocol execution" is enabled.)	• If data could be received before protocol execution, disable the "Clear OS area (receive data area) before protocol execution" setting in "Protocol detailed setting" of GX Configurator-SC.				○
	• The Q series C24 data communications monitoring time is set to "Infinite wait", or the monitoring time is too long.	• Set monitoring time or shorten the specified time, and then transmit data from the external device to find a cause from the timeout error. • Part of the messages is not read. • Transmission from the external device is interrupted. • Perform cancel processing to complete the CPRTCL instruction execution.				○

11.3.7 Communication error "NAK"

<table>
<tr><th>Symptom</th><th>Cause</th><th>Corrective action</th><th>MC</th><th>Bidirectional</th><th>Non procedure</th><th>Pre-defined</th></tr>
<tr><td rowspan="2">• Communication error signal "NAK" turned on.</td><td>• See section that describes the communication error signal ("C/N", "P/S", "PRO", "SIO") that are turned on simultaneously when the "NAK" signal is turned on.</td><td>• Take corrective action corresponding to the contents of the error.</td><td>○</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Note
Since the error code is added to "NAK" and is transmitted from the Q series C24 to the external device when the "NAK" signal is turned on, take the corrective action described in the error code table (see Section 11.2).
Since the error code added when "NAK" is transmitted is stored to the Q series C24 buffer memory shown below, it can also be checked at the Q series C24.
<table>
<tr><th colspan="2">Error code storage buffer memory address</th></tr>
<tr><td>CH1 side</td><td>25A_H</td></tr>
<tr><td>CH2 side</td><td>26A_H</td></tr>
</table></td></tr>
</table>

11.3.8 Communication error "C/N"

<table>
<tr><th>Symptom</th><th>Cause</th><th>Corrective action</th><th>MC</th><th>Bidirectional</th><th>Non procedure</th><th>Pre-defined</th></tr>
<tr><td rowspan="3">• Communication error signal "C/N" turned on.</td><td>• The Q series C24 cannot be installed in the CPU.</td><td>• Change to a CPU to which the Q series C24 can be installed.</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• PC No. designated local station (FF), or a station other than a station No. set with the network parameters.</td><td>• Change the PC No. to local station (FF), or a station No. set with the network parameter and restart data communications.</td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>• Routing parameters between CPU with the Q series C24 loaded and communications destination CPU are not set.</td><td>• Check the routing parameters and set them up to the communications destination CPU.</td><td>○</td><td></td><td></td><td></td></tr>
</table>

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Communication error signal "C/N" turned on.	• An error was generated on the CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10.	• Check the error contents from the state of SB and SW related to the CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 with the GX Developer monitor, etc. and perform the checks and take the corrective action described in the CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 reference manual.	○			
	• The local station CPU on the CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10 generated an error.					
	• Module installation address designation during communications with intelligent function module is incorrect.	• Change the transmit message designation data.	○			
	• A command that cannot be transmitted during RUN (sequence program, parameters, etc.) was transmitted, or "Disable write during RUN" is set.	• Stop the CPU and restart data communications.	○			
		• Set the "Enable/disable write during RUN" switch to "Enable" by command.	○			

11.3.9 Communication error "P/S"

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Communication error signal "P/S" turned on.	• Data does not match the parity bit setting.	• Check the Q series C24 and external device data format and match the settings.	○	○	○	○
	• Sum check codes do not match.	• Check if the sum check code transmitted from the external device is correct. (Recalculate)	○			
	• When CH1 and CH2 are used in the linked mode, the cable is not connected to one of the interface.	• When using CH1 and CH2 independently, check that the Q series C24 is not in the linked mode. • When using CH1 and CH2 in the linked mode, also connect the cable to both of the interfaces. Note • If the cable is not connected to one of the interfaces when CH1 and CH2 are used in the linked mode, noise may enter and the data may be destroyed and "Data cannot be decoded" or "Communications error cause" may occur.	○	○	○	

11.3.10 Communication error "PRO."

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Communication error signal "PRO" turned on.	• Communications were performed with a control procedure different from the Q series C24 communication protocol setting. • Some of the data are different from the control procedure. • Designated command does not exist. • The device No. designation is not the character count corresponding to the command.	• Check the Q series C24 communication protocol setting and the message from the external device and match the settings, or correct the message and restart data communications. • Use the communication monitoring function to check the message from the external device.	○			
	• The characters in the message include a data other than the "A to Z", "0 to 9", "␣", and control data.	• Check and correct the external device message and restart data communications. • Use the communication monitoring function to check the message from the external device. Note • Only the data "0 to 9" and "A to F" can be handled as character area data during communications using an MC protocol (ASCII mode). Therefore, when transmitting a character string as data, convert the ASCII code of each character string to 2-byte binary code. Examples) • Transmitting the character "G" The ASCII code for the character "G" is 47H and is transmitted as the two bytes 34H, 37H. • Transmitting the character "A" The ASCII code for "A" is 41H and is transmitted as the two bytes 34H, 31H. If the ASCII code 41H for the character "A" is transmitted unchanged, the Q series C24 ASCII-BIN conversion will convert it to AH (10) and pass it to the programmable controller CPU.	○			
	• A device No. outside the designated range was designated.	• When designating a device, check "Device setting" of the parameters written to the CPU and correct it to a device No. within the designated range and restart data communications.	○			
	• A remote RUN/STOP request was issued while remote STOP was applied from another module.	• Check if remote STOP is applied from another module and restart data communications.	○			

11.3.11 Communication error "SIO"

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Communication error signal "SIO" turned on.	• Data does not match the stop bit setting.	• Check if the Q series C24 and external device settings are the same.	○	○	○	○
	• Transmission rate is too fast and the next data is transmitted before the Q series C24 completes processing of the receive data.	• Decrease the transmission rate and restart data communications.	○	○	○	○
	• Data larger than the receive buffer size was received.	• Use DTR and DC control and interrupt transmission before the buffer becomes full. Perform RS and CS control when the modem function is used. • Increase the transmission interval and provide an ample programmable controller CPU read processing time. Note • The non procedure protocol stores the data received up to first the end code received, or fixed length data, to the non procedure receive buffer memory and turns on the Read Request signal to the programmable controller CPU. If the next data is sent while the Read Request signal is ON, the data is temporarily stored to the OS receive buffer. When the OS receive buffer becomes full, the Q series C24 skips the rest of the data and turns on the "SIO" LED.		○	○	○
	• With a multidrop link, two or more devices transmitted data at the same time.	• Connect the external devices and the Q series C24 in a 1:1 configuration and perform a communications test. Since data is transmitted simultaneously from two or more devices with a multidrop link when normal communications among all the devices is possible, interlock the devices so that cannot transmit simultaneously.	○	○	○	○

11.3.12 Communication error "CH1 ERR." or "CH2 ERR."

<table>
<tr><th>Symptom</th><th>Cause</th><th>Corrective action</th><th>MC</th><th>Bidirectional</th><th>Non procedure</th><th>Pre-defined</th></tr>
<tr><td rowspan="6">• "ERR." LED turned on.</td><td>• There is an error in the communication protocol or transmission setting.</td><td>• Read the error code from the buffer memory and check the error contents and change the switch setting to the correct setting.</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• There is an error in the on-line mode switching designation.</td><td>• Read the error code from the buffer memory and check the error contents and correct the designation contents.</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• On-demand execution generated an error.</td><td>• Read the error code from the buffer memory and check the error contents and correct the designation contents.</td><td>○</td><td></td><td></td><td></td></tr>
<tr><td>• The Q series C24 detected an error while transmitting data.</td><td>• Read the error code from the buffer memory and take the corrective action corresponding to the error contents.</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>• The Q series C24 detected an error while receiving data.</td><td>• Read the error code from the buffer memory and take the corrective action corresponding to the error contents.</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="6">Note
• When the "ERR." LED is turned on, an error code is stored in the following buffer memory.
<table>
<tr><th rowspan="2">Error cause</th><th colspan="3">Error code storage buffer memory</th></tr>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td>Switch setting error
Mode switching error</td><td colspan="2">203H</td><td>Switch setting error and mode switching error status</td></tr>
<tr><td>On-demand execution error</td><td>256H</td><td>266H</td><td>On-demand execution result</td></tr>
<tr><td>Data transmission error</td><td>257H</td><td>267H</td><td>Data transmission result</td></tr>
<tr><td>Data receive error</td><td>258H</td><td>268H</td><td>Data reception result</td></tr>
<tr><td>Modern function error</td><td colspan="2">221H</td><td>Modern function error code</td></tr>
<tr><td>MC protocol transmission error</td><td>25AH</td><td>26AH</td><td>MC protocol transmission error code</td></tr>
<tr><td>Monitoring device error</td><td>2205H</td><td>2305H</td><td>Programmable controller CPU monitoring function execution result</td></tr>
<tr><td>Pre-defined protocol function error</td><td>4042H</td><td>4052H</td><td>Pre-defined protocol function error code</td></tr>
</table>
∗ See Section 11.2 for a detailed description of the error codes.</td></tr>
<tr><td rowspan="2">• When the pre-defined protocol is executed, the "ERR." LED turns on.</td><td>• The communication protocol mode is set to other than "Pre-defined protocol mode".</td><td>• Set the communication protocol mode to "Pre-defined protocol mode".</td><td></td><td></td><td></td><td>○</td></tr>
<tr><td>• No protocol setting data have been written to the Q series C24.</td><td>* Write the protocol setting data from GX Configurator-SC (Pre-defined protocol support function) and then execute the CPRTCL instruction.</td><td></td><td></td><td></td><td>○</td></tr>
</table>

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• When the pre-defined protocol is executed, the "ERR." LED turns on.	• The protocol corresponding to the protocol No. specified in the control data for the CPRTCL instruction is not registered.	• By GX Configurator-SC (Pre-defined protocol support function), read the protocol setting from the Q series C24. On the protocol selection screen, check the registered protocol and protocol No. for an error.				○
	• To the same channel, multiple CPRTCL instructions were concurrently executed.	• Correct the sequence program so that, upon completion of one CPRTCL instruction execution, another is executed.				○
	• Incorrect control data are specified for the CPRTCL instruction.	• Correct the control data for the CPRTCL instruction.				○
	• The user-edited protocol setting in GX Configurator-SC (Pre-defined protocol support function) is inconsistent with the packet format of the external device.	• Check the packet format of the external device, and correct the protocol setting. (1) When a conversion variable exists in the receive packet, check for an error in the setting of Conversion, Sign character, Number of decimals, Delimiter, or Number of digits. (2) When an error check code exists in the receive packet, check for an error in the setting of Processing method, Code type, Data length, Data flow, Complement calculation, or Calculating range. (3) When Length exists in the receive packet and a conversion variable is included in the calculating range of the Length, check for an error in Code type, Data length, Data flow, or Calculating range set for the Length.				○
	• An expected packet was not received, and a monitoring timeout error occurred.	• Using Circuit trace (communication data monitoring function) of GX Configurator-SC (Pre-defined protocol support function), check the data sent from the external device. • If the data sent from the external device is correct, take measures according to Sections 11.3.11 and 11.3.12.				○
	• A communication error occurs.	• Confirm the error by the system monitor, and remove the cause of the error.				○

REMARKS

When the "ERR." LED is turned on, an error code is stored in the following buffer memory.

Error	Buffer memory
Switch setting error or Mode switching error	Switch setting error and mode switching error area (address: 203H)
On-demand execution error	On-demand execution result area (address: 256H/266H)
Data transmission error	Data transmission result area (address: 257H/267H)
Data reception error	Data reception result area (address: 258H/268H)
Modem function error	Modem function error code area (address: 221H)
MC protocol transmission error	MC protocol transmission error code (address: 25AH/26AH)
Monitoring device error	Programmable controller CPU monitoring function execution result (address: 2205H/2305H)
Pre-defined protocol function error	Pre-defined protocol status function error code (address: 4042H/4052H)

11.3.13 Communication is intermittent.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Communications are intermittently established and lost. (＊1)	• With a multidrop link, two or more devices transmitted data at the same time.	• Connect the external devices and the Q series C24 in a 1:1 configuration and perform a communications test. Since data is transmitted simultaneously from two or more devices with a multidrop link when normal communications among all the devices is possible, interlock the external devices so that they do not transmit simultaneously.	○	○	○	○
	• The signal cable wiring connection is faulty.	• Replace the cable, or make the connections firm.	○	○	○	○
	• When "Check CD terminal" is set, the CD(DCD) signal is turned on/off repeatedly.	• Change the wiring so that the CD(DCD) signal remains ON all the time, or change the setting to "Do not check CD terminal".	○	○	○	○
	• When half-duplex communications is selected, the ON/OFF timing of each signal is not matched.	• Control the external device so that the ON/OFF timing of each signal is matched. See User's Manual (Application).		○	○	○
	• Requested processing of the next transmission before the processing of the current transmission is completed. • Requested processing of the next reception before the processing of the current reception is completed.	• Make sure to obtain handshake in the sequence program.	○	○	○	○
	• Communication via modem is disrupted.	• Since communication via modem may be disrupted due to low line quality or instantaneous interruption, create a sequence program for reconnecting the line in case of unexpected line disruption. If this symptom occurs frequently, reduce the communication speed of the modem, and retry the communication.	○	○	○	
	• The data sent from the Q series C24 are received back on the RS-422/485 interface (CH2) side.	• Disable the echo back in the Echo back enable/disable setting before communication.	○	○	○	○

＊1 The following explains how to take corrective actions when a normal exit response message cannot be received upon sending of a command message.

(a) When a response message of abnormal end is received

1) When an external device sent a command message and received an abnormal end response message, take corrective action with the error according to the error code in the response message (see Section 11.2).

2) When the following problem occurs at the time of access to other station CPU, clear the programmable controller CPU information and retry. (Refer to Section 11.1.7.)
   • Accessible device range is narrowed. (Error code: 7140H)
   • Some of commands and/or devices cannot be used. (Error code: 7142H, 714DH)

(b) When response messages cannot be received
Change the setting value for the response monitoring time (timer 1, default value is 5 seconds).
(See the User's Manual (Application).)
If response messages still cannot be received after changing the setting value, check the communication protocol setting of the corresponding interface, the ON status of the displayed LED, and the connection cable.

(c) When the first part of a response message cannot be received
Increase the setting value of the message wait time (the default value is 0 ms).
(See the User's Manual (Application).)
If response messages still cannot be received after increasing the setting value, it is necessary to reduce the processing time from the end of transmission processing to the start of reception processing on the external device side.

11.3.14 Undecidable data are transmitted or received.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Data that cannot be decoded was transmitted and received	• With a multidrop link, two or more devices transmitted data at the same time.	• Connect the external devices and the Q series C24 in a 1:1 configuration and perform a communications test. Since data is transmitted simultaneously from two or more devices with a multidrop link when normal data communications among all the devices is possible, interlock the external devices so that they do not transmit simultaneously.	○	○	○	○
	• Data does not match the parity bit setting.	• Match the Q series C24 and external device parity bit settings. Note • If the setting of one side is data bit length 7 bits and with parity and the setting of the other side is data length 8 bits and without parity, the number of transmission/receive bits will be the same and the data will sent and receive without generating an error.	○	○	○	○
	• Data does not match the parity bit setting.		○	○	○	○
	• Transmission rate settings do not match.	• Match the Q series C24 and external device transmission rates.	○	○	○	○
	• With a multidrop link, the terminal resistor is not connected correctly.	• Check if the terminal resistor (110Ω or 330Ω in case of the Q series C24) is connected to the stations at both ends of the link.	○	○	○	○
	• When CH1 and CH2 are used to the linked mode, there is an interface without cable connection.	• When using CH1 and CH2 independently, check that the Q series C24 is not in the linked mode. • When using CH1 and CH2 in the linked mode, also connect the cable to both of the interfaces. Note • If the cable is not connected to one of the interfaces when CH1 and CH2 are used in the linked mode, noise may enter and destroy the data and "Data cannot be decoded" or "Communication error cause" may occur.	○	○	○	

11.3.15 Whether the communication error is caused on the Q series C24 or external device is unclear.

Symptom	Cause	Corrective action	MC	Bidirectional	Non procedure	Pre-defined
• Whether the communications error cause is in the Q series C24 or an external device is unclear.	—	• Test the Q series C24 as described below to check where the cause is. 1) Check the hardware. • The Q series C24 must be installed firmly. • The pins of the Q series C24 must not be bent or otherwise abnormal. 2) Test the Q series C24 alone. (See Section 4.7.) • ROM/RAM/switch test must not generate any errors. • Self-loopback test must not generate any errors. 3) Check the state of the programmable controller CPU. • There must not be any errors that stop programmable controller CPU operation. Note • The following methods are available for testing if normal communications are possible with the Q series C24 alone. 1) With one the Q series C24, set CH1 and CH2 to the non procedure protocol and connect the wiring the same as for the self-loopback test and transmit data from one channel and receive the transmitted data at the other channel. If the transmitted data and the received data are the same, transmit and receive processing is performed normally. 2) When two Q series C24 are available, set one Q series C24 to the non procedure protocol and the other Q series C24 to the MC protocol and transmit an MC protocol message from the non procedure protocol station. If the MC protocol station returns the transmit message normally, transmit and receive processing is normal.	○	○	○	○

11.3.16 Communication is not available via the modem.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• Auto modem initialization cannot be executed.	• A modem initialization error occurs.	• Check the error code and execute processing accordingly.	○	○	○	
	• Modem connection channel designation is not performed.	• Set Modem connection channel designation.	○	○	○	
	• There is an error in the switch settings in the GX Developer.	• Review the switch settings. Set it to match the local station modem and the TA.	○	○	○	
• Data cannot be communicated with GX Developer supporting the Q series C24.	• Communication protocol setting is incorrect.	• Set the communication protocol to MC protocol, format 5.	○			
	• Transmission setting does not match the external device.	• Review the transmission setting.	○			
	• Communication rate does not match the external device.	• Review the communication rate setting.	○			
• The GX Developer does not receive the callback signals from the Q series C24.	• The product is not supported by the GX Developer.	• Confirm the GX Developer's S/W version.	○			
	• There was an error in the GX Developer connection system.	• Check the GX Developer's connection system. • Set the connection system on “callback reception waiting” and connect.	○			
	• There is an error in the GX Developer side's modem settings.	• Set the modem's settings on "Auto Reception."	○			
• Callback connections from the GX Developer are refused by the Q series C24.	• There s an error in the GX Developer's connection system.	• Check the GX Developer's connection system. • Correct the Q series C24's settings.	○			
	• There is an error in the connection system's telephone No.	• Check the telephone No. • Change the telephone No. to the data for callback.	○			
• When performing Auto (callback: during fixed/ during designated number) from the GX Developer, connection to the Q series C24 is refused.	• There is an error in the Q series C24 setting value.	• Set the callback function designation on the setting 1 to 3.	○			
	• There is an error in the GX Developer's connection system.	• Check the GX Developer's connection system. • Check the Q series C24's settings.	○			
	• There is an error in the telephone No. of the connection system.	• Check the telephone No. • Change the telephone No. to the data for callback.	○			
• It is possible to connect from the GX Developer, but callback from the Q series C24 cannot be performed.	• The timer value for the status of the modem used or the line is short.	• Adjust each of the timer values for the callback function on the GX Developer side. (Line callback cancel wait time, callback delay time)	○			
	• There is a problem with the modem specifications or settings.	• Check the modem's specifications and settings.	○			

11.3.17 Communication is not available with the ISDN sub-address.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• Data cannot be communicated with ISDN sub-address	• Sub-address is incorrect.	• Review the sub-address.	○	○		
	• Modem does not support ISDN sub-address.	• Use modem that supports ISDN sub-address.	○	○		
	• Sub-address is incorrectly partitioned.	• Review how to partition the sub-address using the TA manual.	○	○		

11.3.18 Periodic transmission is not performed normally.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• Does not operate in the cycle time designated in the constant cycle transmission setting	• The setting value of the constant cycle transmission is incorrect.	• Review the constant cycle transmission setting.	○	○		
	• The cycle time is affected by some causes.	• Remove the causes or designate the cycle time anticipating the causes.	○	○		

11.3.19 Condition agreement transmission is not performed normally.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• Does not operate in the cycle time designated in condition agreement transmission setting	• The setting value of the condition agreement transmission is incorrect.	• Review the condition agreement transmission setting.	○	○		
	• The cycle time is affected by some causes.	• Remove the causes or designate the cycle time anticipating the causes.	○	○		

11.3.20 Data cannot be received due to by an interrupt program.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• Cannot receive data with the interrupt program	• Interrupt issuance was not designated.	• Designate interrupt issuance.		○	○	
	• Receiving by instruction other than BUFRCVS.	• Use BUFRCVS instruction to receive interrupt data.		○	○	
	• "Parameter setting" - "PC system setting" - or "Interrupt pointer setting" are not set on the programmable controller CPU side, or the settings are incorrect.	• Review "Parameter setting" - "PS system setting" - "Interrupt pointer setting" on the programmable controller CPU side		○	○	

11.3.21 Data cannot be written to the flash ROM.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• Cannot write data to Flash ROM	• Flash ROM overwrite allow/prohibit was not set to allow.	• Set flash ROM overwrite allow/prohibit to allow.	○	○	○	○
	• Setting change was not set to allow in the switch settings by GX Developer.	• Set setting change to allow in the switch setting by GX Developer.	○	○	○	○
	• When a multiple CPU system is used, a target CPU is specified in "Multiple CPU setting" of "Transfer Setup" in GX Developer.	• Connect GX Configurator-SC to the control CPU of the Q series C24, and save the system setting data to the flash ROM.	○	○	○	○
	• When the Q series C24 is mounted on an extension base unit of the Q12PRH/Q25PRHCPU, the communication path set in GX Developer is incorrect.	• Directly connect the CPU, or change the communication path so that it is routed through an intelligent function module on the main base unit. (Refer to Section 2.5.) • In "Transfer Setup" of GX Developer, select "Not specified" for "Target system". (Refer to Section 2.5)	○	○	○	○
• The data written to the flash ROM are not valid.	• The Q series C24 was turned off during writing to the flash ROM.	• Write the data again to the flash ROM.	○	○	○	○
	• Communication with GX Configurator-SC was interrupted during writing to the flash ROM.					
	• When data is written to the Programmable controller, the Q series C24 of the "Intelligent Function Module" tab is not set as a target memory on the "Online Data Operation" screen. (When using GX Works2)	• Check the procedure for writing data to the flash ROM, and write the data to the flash ROM again.	○	○	○	○

11.3.22 Troubleshooting on the protocol setting data reading/writing

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• The "ERR." LED turns on when protocol setting data are written to the Q series C24.	• The user-edited protocol setting in GX Configurator-SC (Pre-defined protocol support function) has an error. Or, function data not supported by the Q series C24 are included in the protocol setting data.	• In Protocol setting data error information (buffer memory: 4086H to 4089H), locate the error part (protocol No, packet No, or element No.) and correct it. Check the protocol setting for an error paying attention to the following, and write corrected data to the Q series C24 again. (1) When an error was detected in the user-edited protocol Check if the following condition for element placement are satisfied in the packet setting or not: If any elements of 1) and 2) are in the same packet, 1) must be placed before 2). 1)• Conversion variable (fixed number of data, fixed number of digits (1 to 10), no sign character) • Conversion variable (fixed number of data, fixed number of digits (1 to 10), variable decimal point) • Conversion variable (fixed number of data, variable number of digits, number of data is 1, delimiter set) 2)• Non-conversion variable (variable length) • Conversion variable (variable number of data) • Conversion variable (fixed number of data, variable number of digits, number of data is 1, no delimiter) • Conversion variable (fixed number of data, variable number of digits, number of data is 2 or more) • Non-verified reception (variable number of characters) (2) When function data not supported by the Q series C24 are included in the protocol setting data Check the version of the Q series C24N to confirm supported functions. Set the protocol within the range of supported functions if any unsupported function is applied.				○

11.3.23 The "ERR" LED is lit.

Symptom	Cause	Corrective action	MC	Non procedure protocol	Bidirectional protocol	Pre-defined
• "ERR" LED is lit	• A communication error has occurred.	• Check the error and remove the cause according to Section 11.1.1.	○	○	○	○
	• Switch settings of the Q series C24 are incorrect.	• Review the switch settings of the Q series C24.	○	○	○	○
	• The communication protocol mode is set to "Pre-defined protocol mode", and linked operation is set for two interfaces.	• For communication in the pre-defined protocol mode, change the setting to separate operations.				○
	• The Q series C24 is powered off while data are written to the flash ROM.	• Write the data to the flash ROM again.	○	○	○	○

APPENDICES

Appendix 1 Functional Improvements of the Q Series C24

A

The Q series C24 of function version B has several functions that have been added or changed from the conventional product (function version A).
This chapter explains a comparison of the functions of Q series C24/GX Configurator-SC accompanied by the change/addition of functions, and explains how to utilize programs created for function version A as well as how to incorporate function version B modules into the existing system.

Appendix 1.1 Comparison of Q series C24/GX Configurator-SC/GX Works2

(1) Comparison of the functions of Q series C24

The following table lists the functions of Q series C24.

Function				Q series C24 (function version)		
				QJ71C24N (-R2/R4)	QJ71C24 (-R2)	
				B	B	A
Communication using the MC protocol				○	○	○
	Communication with ASCII code	Communication with QnA compatible 2C/3C/4C frame	Formats 1 to 4 exist for each.	○	○	○
		Communication with A compatible 1C frame		○	○	○
	Communication with binary code	Communication with QnA compatible 4C frame	Format 5	○	○	○
	Read/write of device memory	Batch read/write in bit/word units		○	○	○
		Monitoring of device memory		○	○	○
		Batch read/write of multiple blocks		○	○	○
		Read/write by extension designation		○	○	○
		Accessing other stations via network system		○	○	○
		Access to link direct device LW10000 or higher		△ (*1)	×	×
		Access to extended data register D65536 or higher or extended link register W10000 or higher		△ (*1)	×	×
	Reading/writing from/to the buffer memory of the Q series C24			○	○	○
	Reading/writing from/to the buffer memory of intelligent function modules			○	○	○
	Reading/writing from/to sequence program files			○	○	○
	Monitoring the programmable controller CPUs (programmable controller CPU monitoring function)			○	○	○
		Transmission of the monitoring information using the modem function.		○	○	×
	Status control of the programmable controller CPUs (remote RUN/STOP, etc.)			○	○	○
	Turning on/off input signals of the Q series C24 from an external device (global function)			○	○	○
	Data transmission from a programmable controller CPU to an external device (on-demand function)			○	○	○
	Specification of station No. 65 to 120			△ (*1)	×	×
Communication using non-procedure protocol				○	○	○
	Data transmission/reception in any format			○	○	○
	Data transmission/reception using user frames			○	○	○
		Data reception using format-0 (*2)		○	○	○
		Data reception using format-1		○	○	×
	Data reception by interrupt programs			○	○	○
	Monitoring the programmable controller CPUs (programmable controller CPU monitoring function)			○	○	○
		Transmission of the monitoring information using the modem function.		○	○	×
	ASCII data transmission/reception by ASCII-BIN conversion			○	○	○
	Data transmission/reception by specifying transparent code			○	○	○
		Specification of Receive transparent code		○	○	○
		Specification of Transmission transparent 1st (*3)		○	○	○
		Multiple specification of Transmission transparent 2nd to 10th		○	○	×
	Reception data clear by dedicated instruction (CSET instruction)			○	○	×

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A

Function				Q series C24 (function version)		
				QJ71C24N (-R2/R4)	QJ71C24 (-R2)	
				B	B	A
Communication using bidirectional protocol				○	○	○
	Data transmission/reception in any format			○	○	○
	Data reception by interrupt programs			○	○	○
	ASCII data transmission/reception by ASCII-BIN conversion			○	○	○
	Data transmission/reception by specifying transparent code			○	○	○
		Specification of Receive transparent code		○	○	○
		Specification of Transmission transparent 1st (＊3)		○	○	○
		Multiple specification of Transmission transparent 2nd to 10th		○	○	×
Communication using pre-defined protocol				△ (＊1)	×	×
	Execution of the protocol selected from the pre-defined protocol library			△ (＊1)	×	×
	Execution of the created or edited protocol			△ (＊1)	×	×
	Addition of Sign character, Number of decimals, and Delimiter settings to Conversion variable			△ (＊1)	×	×
	Variable number of characters setting for Non-verified reception			△ (＊1)	×	×
Echo back enable/disable setting for RS-422/485 interface				△ (＊1)	×	×
Registration of user frame for data communication				○	○	○
	Registration of changeable data (added 05_H, $0B_H$, 11_H, and 17_H)			○	○	×
	Registration of changeable data (added 04_H and $0A_H$)			○	×	×
	Registration of changeable data (added $E5_H$ and EB_H)			△ (＊1)	×	×
Communication via public network, etc. (modem function)				○	○	○
	Automatic initialization of modem			○	△ (＊1)	×
	Remote password check			○	○	×
	Callback (＊4)			○	△ (＊1)	×
Transmission control		DC code control (including Xon/Xoff control)		○	○	○
		DTR/DSR control		○	○	○
Mode switching				○	○	○
	Switch to GX Developer connection mode			○	×	×
Independent/linked operation of each interface				○	○	○
Support for 230400 bps				○	×	×
Data transmission/reception at low speed (transmission speed: 50 bps)				○	○	×
Control of RS(RTS) and ER(DTR) signal states				○	×	×
Programmable controller CPU information clear				△ (＊1)	×	×
Data communication monitoring time				○	○	○
	Non procedure and non reception monitoring time format designation			○	×	×
Transmission control start/end free area designation				○	×	×
Communication data monitoring function				○	×	×
UINI instruction				△ (＊1)	×	×
Monitoring/testing of initial settings and setting values with utility package				○	○	○
	Startup from the system monitor (＊5)			○	○	○
	Addition to the setting items			(See (2))		—
GX Developer and GOT connection				○	○	○
	Simultaneous connection of GX Developer and GOT to the Q series C24 (＊6)			○	○	×
Support for multiple CPU system				○	○	×
	Communication with non-control CPU using the MC protocol			○	○	×
		Communication with QnA compatible 4C frame (ASCII code)	Formats 1 to 4	○	○	×
		Communication with QnA compatible 4C frame (binary code)	Format 5	○	○	×
	Multiple CPU setting using GX Developer (I/O assignment, switch setting, interrupt pointer setting, etc.)			○	○	×

○ : Usable
△ : Usable (Model serial no. limited)
× : Usable

∗1 There is restriction on serial no. of the Q series C24 or programmable controller CPU that can use the function.
For version verification, see section 2.7.
∗2 The data reception using format-0 refers to the method of receiving data by user frame, which was supported in the Q series C24 of function version A.
∗3 The Q series C24 of function version A is capable of setting one pair of transparent code and additional code per interface for both transmission and reception.
∗4 This function can be used when connecting with GX Developer.
∗5 This function is available in GX Developer Version 6 or later.
∗6 GX Developer can only be connected to the CH1 side in case of the Q series C24 of function version A.
It is not possible to connect both GX Developer and the GOT to the two interfaces at the same time.

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(2) List of added setting items for GX Configurator-SC

The following table lists the setting items added to GX Configurator-SC due to a software version upgrade.

Screen	Additional setting item	Software version							Reference section
		Ver. 2				Ver. 1	SW0D5C-QSCU-E		
		20W	11M	06G	00A	10L	40E, 30D, 20C	10B, 00A	
Modem function monitor/test	Accumulated count of unlock process normal completion	○	○	○	○	○	○	×	Section 9.4.4 Section 9.6.2
	Accumulated count of unlock process abnormal completion	○	○	○	○	○	○	×	
	Accumulated count of lock process based on circuit disconnect	○	○	○	○	○	○	×	
	Callback permit accumulated count	○	○	○	○	○	×	×	
	Callback denial accumulated count	○	○	○	○	○	×	×	
	Auto (callback) connection permit accumulated count	○	○	○	○	○	×	×	
	Auto (callback) connection denial accumulated count	○	○	○	○	○	×	×	
	Accumulated count of callback receive procedure cancel	○	○	○	○	○	×	×	
Modem function system setting	Circuit disconnect wait time (PLC CPU watch use)	○	○	○	○	○	○	×	
	Remote password mismatch notification count designation	○	○	○	○	○	○	×	
	Remote password mismatch notification accumulated count designation	○	○	○	○	○	○	×	
	Auto modem initialization designation	○	○	○	○	○	×	×	
	Callback function designation	○	○	○	○	○	×	×	
	Callback denial notification accumulated count designation	○	○	○	○	○	×	×	
	Data No. for callback designation 1 to 10	○	○	○	○	○	×	×	
Transmission control and other monitoring/tests	RS-232 control signal status CS (CTS)	○	○	○	○	×	×	×	Section 9.4.5 Section 9.6.3
Transmission control and other system settings	RTS (RS) designation	○	○	○	○	×	×	×	
	DTR (ER) designation	○	○	○	○	×	×	×	
	Transmission control start free area	○	○	○	○	×	×	×	
	Transmission control end free area	○	○	○	○	×	×	×	
	Send/Recv data monitoring designation	○	○	○	○	×	×	×	
	Action for buffer full	○	○	○	○	×	×	×	
	Stop by Timer 0 error	○	○	○	○	×	×	×	
	Monitor buffer head address	○	○	○	○	×	×	×	
	Monitor buffer size	○	○	○	○	×	×	×	
	Transmission transparent code designation (2nd to 10th)	○	○	○	○	○	○	×	
	Echo back enable/disable setting (for RS-422/485 I/F)	○	×	×	×	×	×	×	Section 3.3.4
Non procedure system setting Non procedure monitor/test	User frame receive format designation (1st to 4th)	○	○	○	○	○	○	×	Section 9.4.7 Section 9.6.5
	Exclusive format-1 received data count (1st to 4th)	○	○	○	○	○	○	×	
	Timeout at No-protocol	○	○	○	○	×	×	×	

Screen	Additional setting item	Software version							Reference section
		Ver. 2				Ver. 1	SW0D5C-QSCU-E		
		20W	11M	06G	00A	10L	40E, 30D, 20C	10B, 00A	
Pre-defined protocol monitor/test	Protocol cancel specification	○	×	×	×	×	×	×	Section 8.1.3, 9.6.7 Operating Manual (Pre-defined protocol support function)
	Execution status	○	×	×	×	×	×	×	Section 8.1.3, 9.6.7
	Pre-defined protocol function error code	○	×	×	×	×	×	×	Section 9.6.7, 11.2.1
	Execution log options	○	×	×	×	×	×	×	Section 8.1.3, 9.6.7
	Number of protocol executions	○	×	×	×	×	×	×	Section 8.1.3, 9.6.7
Pre-defined protocol system setting	Execution log options	○	×	×	×	×	×	×	Section 8.1.2, 9.4.9
Monitor/test others	Station. No. (Instruction setting)	○	○	○	×	×	×	×	Section 9.6.10
	Communication error clear request for CH□ and to turn LED off	○	○	○	×	×	×	×	Section 9.6.10 Section 9.6.11
	PLC CPU information clear request	○	○	×	×	×	×	×	Section 9.6.10 Section 11.1.7
Auto refresh setting	Accumulated count of unlock process normal completion	○	○	○	○	○	○	×	Section 4.6
	Accumulated count of unlock process normal completion	○	○	○	○	○	○	×	
	Accumulated count of lock process based on circuit disconnect	○	○	○	○	○	○	×	
	Pre-defined protocol function error code	○	×	×	×	×	×	×	

○ : Setting possible × : Setting impossible

POINT

(1) GX Configurator-SC SW0D5C-QSCU-E 20C or later supports the Q series C24 of function version B.

(2) See Section 2.7 of this manual for how to check the software version of GX Configurator-SC.

(3) Additional setting items in GX Works2

In addition to the setting items in GX Configurator-SC, the following items can be also configured in the auto refresh setting with GX Works2.

Setting item		Buffer memory address		Software version
		CH1	CH2	
For received data	Reception area	600H to 7FFH	A00H to BFFH	Version 1.31H or later
	Reception area (user setting area)	C00H to 1AFFH		
	Reception area (user setting area 2)	2600H to 3FFFH		
For transmitting data	Transmission area	400H to 5FFH	800H to 9FFH	
	Transmission area (user setting area)	C00H to 1AFFH		
	Transmission area (user setting area 2)	2600H to 3FFFH		
For confirmation of communication protocol execution status	Protocol execution status	4041H	4051H	Version 1.40S or later
	Predefined protocol function error code	4042H	4052H	Version 1.31H or later
	Protocol execution count	4043H	4053H	Version 1.40S or later

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Appendix 1.2 Precautions when updating the module from function version A to B

This section explains how to utilize programs created for the Q series C24 of function version A for the Q series C24 of function version B and how to incorporate function version B into the existing system.

(1) Program utilization

Programs created for the Q series C24 of function version A can be used as they are for the Q series C24 of function version B.

(2) Incorporation into the existing system

The wiring used for function version A can be used as is for the Q series C24 of function version B.

Appendix 1.3 Precautions when replacing the QJ71C24(-R2) with the QJ71C24N(-R2/R4)

Although the QJ71C24N(-R2/R4) can use existing programs created for the QJ71C24(-R2) without any changes, take into account the following.
Wiring for the QJ71C24(-R2) can be also used as it is.

(1) Increased internal processing speed

Since the internal processing speed has been increased, the time taken for the QJ71C24N(-R2/R4) to access a programmable controller CPU and to process message transmission to another device is shorter than that of the QJ71C24(-R2). (The usage of functions has not been changed, however, the performance and response time is different.)
When utilizing any existing program, be sure to check the operation in advance and, if necessary, adjust the communication timing.
The following are examples of communication timing adjustment.

(a) When communicating with MC protocol

Increase the message wait time.

Especially, in the case of "Sequence scan time > Message wait time", an adjustment is required.

If the message wait time is too short, the external device may not be able to receive all or the first part of a response message from the Q series C24.

1) For the QnA compatible 3C/4C frames, specify a message wait time in the buffer memory (address 11E$_H$/1BE$_H$).
2) For the A compatible 1C frames, specify a message wait time in a request message sent from the external device.

(b) When communicating with the non-procedure or bidirectional protocol

Delay the data transmission timing.

1) Data transmission from the external device to the QJ71C24N(-R2/R4)
Delay the timing of transmission from the external device. (Adjusted on the external device side)
2) Data transmission from QJ71C24N(-R2/R4) to the external device
For communications with the non-procedure protocol, delay the data transmission by one scan in the sequence program. (For communications with the bidirectional protocol, delay the timing of turning ON the reception data read completion signal by one scan as well.)

Appendix 2 QnA/A Series Module

This section explains a comparison of the functions of the Q series C24 and QnA/A series modules, and explains how to utilize programs created for A series modules as well as how to install the Q series C24 into the existing system.
QnA/A series modules are the products listed in the table below.

Model name	Product name
QC24N	AJ71QC24N (-R2,R4), A1SJ71QC24N1 (-R2), A1SJ71QC24N (-R2)
QC24	AJ71QC24 (-R2,R4), A1SJ71QC24 (-R2)
UC24, C24-S8	AJ71UC24, A1SJ71UC24 (-R2,R4,PRF), AJ71C24-S8

Appendix 2.1 Functional comparison with the Q series C24 and the QnA/A series modules

The following table lists the functional comparison between the Q series C24 and the QnA/A series modules.
The ○ symbol in the model name columns indicates that the corresponding functions are compatible between the applicable models (for more information, see the manual for each module).
Indicates functions that have been added to or modified from the QnA/A series modules.

Function		Q series C24	QC24N	QC24	UC24	C24-S8
Communication using MC protocol		—				
Communication in QnA compatible 3C frame	Communication with ASCII code	○ (＊7) (＊8)	○		×	×
Communication in QnA compatible 4C frame	Communication with ASCII code	○ (＊8)	○			
Communication in QnA compatible 2C frame	Communication with ASCII code	○ (＊8)	○	×	×	×
Communication in A compatible 1C frame	Communication with ASCII code	○	○			
Communication in QnA compatible 4C frame	Communication with binary code	○ (＊7) (＊8)	○		×	×
Read/write of QCPU device memory		—				
Batch read/write of device memory (＊5) ＊ Excluding multiple block batch read/write.		○ (＊7) (＊8)	○		○ (＊1)	○ (＊1)
Multiple block batch read/write (＊5)		○ (＊2) (＊7) (＊8)	○ (＊2)	×	×	×
Accessing other stations (via network/data link)		○ (＊3)	○		○	○
Transmission from the programmable controller CPU (on-demand)	Arbitrary data	○	○		○	○
	Using user frame	○	○		×	×
Communication with m:n connection between the programmable controller CPU and external devices		○	○			
Communication using non procedure protocol		—				
Transmitted/received with arbitrary format		○	○			
Transmitted/received with user frame		○	○		○ (＊4)	×
Transmitted/received with ASCII-BIN conversion		○	○		×	×
Transmitted/received with transparent code designation		○	○		×	×
Communication using bidirectional protocol		—				
Transmitted/received with arbitrary format		○	○			
Transmitted/received with ASCII-BIN conversion		○	○		×	×
Transmitted/received with transparent code designation		○	○		×	×

Function		Q series C24	QC24N	QC24	UC24	C24-S8
Communication using the pre-defined protocol		○	×			
Echo back enable/disable setting for RS-422/485 interface		○ (＊9)	×			
Accessing other stations with link dedicated instructions		×	○ (via QC24 (N))		×	×
Interrupt processing (at data reception)	Non procedure protocol	○	○	○	×	×
	Bidirectional protocol					
Communication via public lines using modem function		△	○	×	×	×
Communication using the programmable controller CPU monitoring function		○	×		×	×
Auto refresh directed to the programmable controller CPU		○	×		×	×
Transmission control	DC code control	○	○			
	DTR/DSR signal control	○	○			
Half-duplex communication control		○	○			
Mode switching		○	○			
Independent operation of two interfaces	Setting the same protocol	○	○		×	
	Setting different protocols	○	○			
Linked operation of two interfaces		○	○		○	
Registering initial setting values of the buffer memory		○ (Flash ROM)	○ (EEPROM)		×	×
Registering user frame					×	×
Connection forms with external devices	1:1, 1:n	○	○			
	m:n	○	○			
I/O signal transmission/receive by multi drop link function		×	×		○	×
Connection of GX Developer		○	○			
Communication data monitoring		△	×		×	×
Registering and monitoring of setting values by the utility package		○	×		×	×
Programmable controller that can be mounted		QCPU MELSECNET/H remote I/O station	QnACPU MELSECNET/10, Remote I/O station		ACPU AnACPU AnUCPU QnACPU	ACPU AnACPU AnUCPU QnACPU
Data transmission rate (bps)		230400 maximum (＊6)	115200 maximum	19200 maximum	19200 maximum	19200 maximum

○: Function exists/possible
△: Function exists/possible (specification is different depends on the function version (see Appendix 1)
×: No function/impossible

＊1 Access is possible only within the range of an AnACPU device.

＊2 A multiple block batch read/write function can be used for the local station QCPU to which the Q series C24 is mounted and the next CPU module, which will be another station, via CC-Link IE Controller Network, CC-Link IE Field Network, MELSECNET/H, MELSECNET/10.

Function	Programmable controller CPU			
	QCPU	QnACPU	Q2AS(H)	Q4AR
Multiple block batch read/write	(All allowed)	(9707B or later products) ＊		(All allowed)

＊ This function is added to modules showing 9707B or later in the package indication and the DATE column of the rating plate.

＊3 Access to other stations cannot be performed via data link system (MELSECNET(II), MELSECNET/B).

＊4 Transmission is only possible using the printer function.

＊5 When the Q series C24 is used, it is possible to read/write a maximum of 960 words (in case of QC24(N), it is possible to read/write a maximum of 480 words.)

＊6 230400 bps can be used via CH1 of QJ71C24N (-R2/R4) only.
The maximum transmission speed of QJ71C24 (-R2) is 115200 bps.

＊7 Accessible to link direct device LW10000 or higher.

＊8 Accessible to extended data register D65536 or higher and extended link register W10000 or higher.

＊9 Available for only the CH2 side of the QJ71C24N(-R4).

Appendix 2.2 Using programs designed for the QC24 (N) and installing the Q series C24 into existing systems

This section explains how to use programs designed for serial communication modules in the QnA series and the installation of the Q series C24 into an existing system.

POINT
When using the Q series C24, make sure to set the operation mode, station number, and transmission specifications with the following parameter setting screen of GX Developer. • "Intelligent function module switch setting" screen The Q series C24 does not have the setting switches to set the operation mode, station number, and transmission specification that are available in the serial communication modules for QnA series.

Appendix 2.2.1 Using programs designed for the QC24 (N)

The data communication between the QnACPU and external devices as well as other QnACPUs which has been performed in the QC24(N) can also be performed by the Q series C24.
The following explains how to use programs designed for QC24(N) during data communication using the Q series C24.

(1) The communication programs directed to the QC24(N) on the external device side and the communication programs on the QnACPU (self-station) side to which the QC24(N) is mounted can be used for the Q series C24.
However, note the following points.
- There is no function that allows data communication with other station's programmable controller CPUs by a data link instruction.
Delete the part of data communication program by data link instructions.
- When using a new function, create a new program.

(2) Make sure to check operation when using communication programs for QC24(N) on the external device side and the QnACPU (self-station) side.

(3) The notes during data communication by RS-422/485 interface also apply to the Q series C24.
- Take measures against data error reception on the external device side (see Section 3.3.3).
- Operation of RS-422/485 interface on the programmable controller side.

Appendix 2.2.2 Installing on existing systems

The following explains the Installation of the Q series C24 on an existing system.

(1) Installing on a multidrop connection system

The Q series C24 can be installed on an existing system to which the programmable controller CPU and external devices are connected as 1:n or m:n multidrop connection (*1).

*1 This is when a QC24(N) or a computer link module (such as AJ71UC24) is used as the programmable controller CPU module of the multidrop connection.

However, there are frame restrictions when data communication is performed. (See the Reference Manual.)

(2) Replacing the QnACPU module with a QCPU

The wiring used by the QC24(N) can be used as is.

POINT
The functional use is the same, except for the functions added by the Q series C24 to the conventional module. However, with the introduction of high-speed QCPUs, there may be cases in which communication cannot be performed normally when a programmable controller module in the QnA series is replaced by a Q series programmable controller. When a module is changed to a Q series programmable controller module, make sure to perform an operation check.

Appendix 2.3 Using programs designed for the computer link module and installing the Q series C24 into existing systems

This section describes how to use programs created for A series computer link modules and installing the Q series C24 into an existing system.

POINT
When using the Q series C24, make sure to set the operation mode, station number, and transmission specifications with the following parameter setting screen of GX Developer. • "Intelligent function module switch setting" screen The Q series C24 does not have the setting switches to set the operation mode, station number, and transmission specification that are available in the computer link module for A series.

Appendix 2.3.1 Using programs designed for the computer link module

The data communication between the programmable controller CPU and external device as well as other programmable controller CPU that has been performed by A series computer link modules (hereinafter abbreviated as UC24/C24-S8) can also be performed using the Q series C24.
However, UC24/C24-S8 and the Q series C24 have major differences in the following points.
For programmable controller CPU side, create a new program according to the explanation in the section of the function used.
(Differences between UC24/C24-S8 and the Q series C24)

- Initial setting items and the setting method of addresses and special application areas of the buffer memory
- Input/output signals for handshake
- Dedicated instructions of the programmable controller CPU

(1) Initial settings for special application area in buffer memory

1) In the Q series C24 the addresses for special application areas in the buffer memory are different from those of UC24/C24-S8. The Q series C24 has more initial setting items.
   The setting method is different such that the settings are performed using the utility package (GX Configurator-SC).
2) Register necessary initial setting values according to Chapter 8.
3) The default value for the CD terminal check setting is changed to "No check".

(2) Data communication using the MC protocol (identical to the communication functions of the dedicated protocol of UC24/C24-S8)

(a) Communication protocol setting
   Data communication is performed using an A compatible 1C frame by setting the communication protocol setting of the Q series C24 specified by GX Developer to the same form as set in the mode setting switch of UC24/C24-S8.

(b) Command message and response message

1) The message format used in the data communication using the A compatible 1C frame is the same as the message format of UC24/C24-S8.
2) Check available commands and devices that can be accessed in the Reference Manual, and access the programmable controller CPU from the external device.
3) For the QCPU, only read/write of device memory is possible.
For the range of devices that can be accessed, see the Reference Manual.
* The devices added to the QCPU, i.e. the latch relay (L) and step relay (S) are accessed using commands for QnA compatible 2C/3C/4C frames. It is necessary to create new programs.

(c) Accessing other stations

1) When accessing other station's programmable controller CPU via the MELSECNET/10, "Valid module during other station access" must be designated in the parameter setting by GX Developer.
2) Check the stations that can be accessed in the Reference Manual, and access the programmable controller CPU from the external device.
3) When it is necessary to access other stations on other MELSECNET/10, data communication must be performed in a QnA compatible 3C/4C frame.
Create a new program for the external device side according to the Reference Manual.
4) It is not possible to access other stations via the MELSECNET(II)/B.

(d) Transmitting data to the external device by the on-demand function

1) The program for data transmission on the programmable controller CPU side is different from when UC24/C24-S8 is used.
Create a new program on the programmable controller CPU side according to the Reference Manual.
2) Data to be sent to the external device is identical to when the UC24/C24-S8 is used.

(3) Data communication using the non procedure protocol

(a) Data transmission/reception

1) The same data transmission/reception as used by UC24/C24-S8 can be performed.
2) Create a new program for data communication upon checking functions and instructions used on the programmable controller CPU side in Chapter 6 of this manual and the User's Manual (Application).
Data transmission/reception is performed using dedicated instructions.

3) When data is received by a reception end code, the external device side must send the end code data (the default is CR+LF (code: $0D_H$ and $0A_H$) at the end of the data sent to the programmable controller CPU side. Once any end code is registered, data can be transmitted in the same way as for the UC24/C24-S8.
4) The external device side can receive data from the Q series C24 in the same ways as UC24.

(b) Message transmission by printer function (when using programs designed for UC24)

1) Message transmission using the printer function of the UC24 can be implemented by the data transmission function that uses a user frame.
2) For the programmable controller CPU, register and send messages according to the User's Manual (Application).
Messages handled by the UC24 will become user frames in the Q series C24.

(4) Data communication using the bidirectional protocol

(a) Setting to add a sum check code to a message
The setting to add a sum check code to a message has been changed. It is set during switch setting operation by GX Developer.

(b) Data transmission/reception

1) The same data transmission/reception as used by UC24/C24-S8 can be performed.
2) Create a new program for data communication upon checking functions and instructions used on the programmable controller CPU side in Chapter 7.
Data transmission/reception is performed using dedicated instructions.
3) The external device can transmit or receive data in the same way as the UC24/C24-S8.

(5) Others

1) The Q series C24 has other functions that are equivalent to those of UC24/C24-S8, which are not mentioned above.
2) Check functions and specifications in this manual and the manuals listed below, and use the applicable functions.
   - User's Manual (Application)
   - Reference Manual

Appendix 2.3.2 Installing the Q series C24 into existing systems

This section shows the notes when installing the Q series C24 into an existing system that uses UC24/C24-S8.

(1) Data communication using m:n connection

When the Q series C24 is installed into an existing system that has an m:n system structure between the programmable controller CPU and external devices, and data communication is performed using the MC protocol, the following notes should be considered:

(a) Accessing the programmable controller using a frame for form 5
When the UC24/C24-S8 is connected on the line, it is not possible to access the programmable controller in the QnA compatible 4C frame (form 5) for binary code communication.

(b) Data communication between external devices

1) When data communication is performed in order to link with an external devices to perform a 1:1 communication with the programmable controller CPU, it is necessary to change the station number (80_H to $A0_H$ $\rightarrow$ 00_H to $1F_H$) designated in the "Station number" and "Local station number" items in the messages on the external device side. (It is not necessary to specify this when an A compatible 1C frame is used.) Alternatively, it is necessary to change the message frame so that it has a data order different from that of the MC protocol.
   - Station number: Designate the number of device to which data is sent
   - Local station number: Designate the number of the device that sends data

2) Perform the data communication according to the User's Manual (Application).

(c) Processing reception data on the external device side
Set the external device so that it ignores the following reception messages that are unrelated to the local station.
   - The command message and the corresponding response message that are sent from other stations when accessing the programmable controller CPU using the MC protocol.
   - Messages when accessing between external devices.

(2) Data communication using 1:n connection

When the UC24/C24-S8 is connected on the line, it is not possible to access the programmable controller in the QnA compatible 4C frame (format 5) for binary code communication.

POINT

Since performances and response speeds are different between the Q series C24 and the UC24/C24-S8, communication may not be performed normally when a programmable controller module in the A series is replaced by a Q series programmable controller.
When a module is changed to a Q series programmable controller module, make sure to check operation.

Appendix 3 Processing Time

(1) Time required to process communication using the non procedure protocol (guideline)

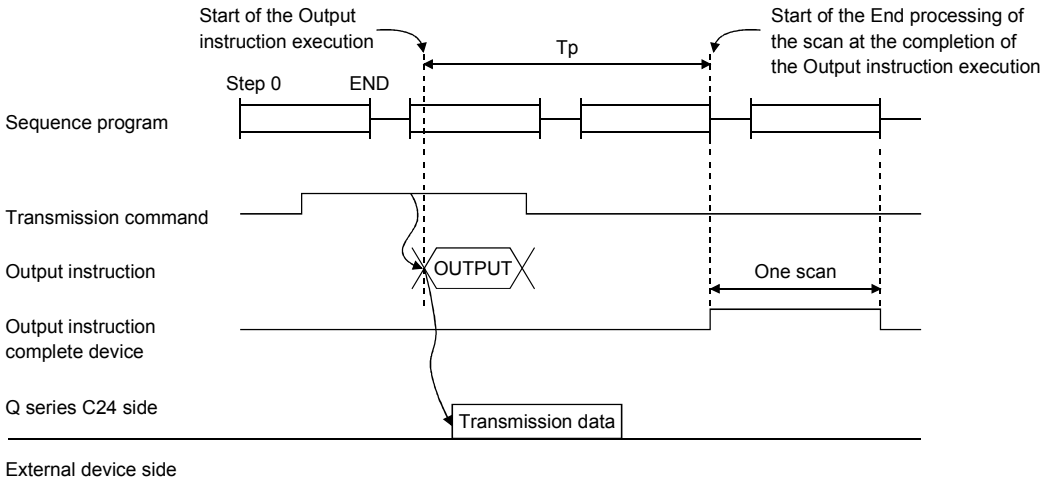
The processing time for the Output and Input instructions can be estimated by the following formula. Note, however, that the processing time may become longer depending on other communication functions (e.g., communication using the MC protocol) and special functions (e.g., ASCII-binary conversion, transmission control) that are used at the same time.
The value obtained from the following formula should be used as a guideline for the processing time when reception or transmission only is performed using only CH1 (RS-232 connection).

(a) Output instruction

$Tp = St + (D_{le}/Cr \times 1000 + 0.07) \times Ds + T1$

Tp (*1) : The time from the start of execution of the Output instruction to the End processing of the sequence scan at the completion of the Output instruction execution (ms)
St : Scan time
D_{le} : Data length of 1 byte at data transmission (number of bits)
Cr : Communication rate (bps)
Ds : Number of bytes of transmission data
T1 : QJ71C24N (-R2/R4) T1 = 3.0
QJ71C24 (-R2) T1 = 4.86

*1 This stands for the time range of processing (Tp).



[Calculation example]

Estimate the time required to process the Output instruction when transmitting 100 bytes of data using the non procedure protocol with the QJ71C24N. (Unit: ms)

- Scan time : 10 ms
- Data length : 10 bits (1 start bit, 8 data bits, 1 stop bit, no parity bit)
- Communication rate : 19200 bps

$10 + (10/19200 \times 1000 + 0.07) \times 100 + 3.0 \fallingdotseq 72.08$ (ms)

(b) Input instruction

Tp = Sr + 0.09 × Dr + T2

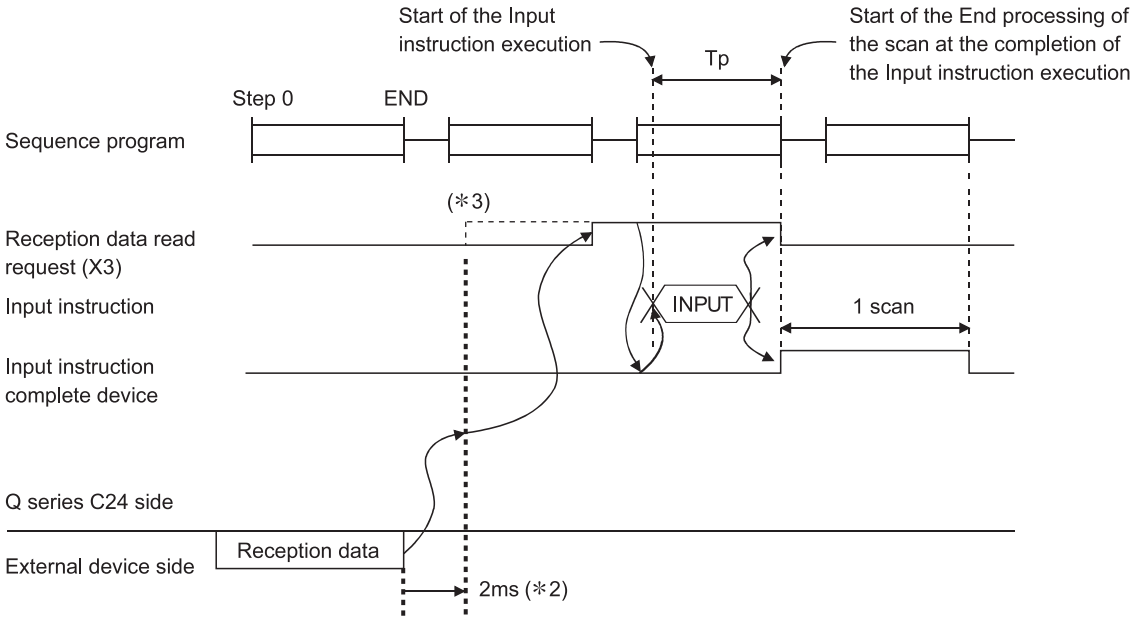
Tp (*1) : Time from the start of execution of the Input instruction to the End processing of the sequence scan at the completion of the Input instruction execution (ms)

Sr : Scan time

Dr : Number of bytes of reception data

T2 : QJ71C24N (-R2/R4) T2 = 7.0
QJ71C24 (-R2) T2 = 14.91

*1 This stands for the time range of processing (Tp).



[Calculation example]

Estimate the time required to process the Input instruction when receiving 100 bytes of data using the non procedure protocol with the QJ71C24N. (Unit: ms)

- Scan time : 10 ms

10 + 0.09 × 100 + 7.0 ≒ 26.00 (ms)

*2 When only using CH1 of the Q series C24 and when processing only 30 bytes of data received, the time until the reception data read request (X3) comes on is displayed after the Q series C24 receives data from the network.

*3 When DX3 (direct mode) is used, the Q series C24 is accessed at the time of the instruction execution on the sequence program. DX3 speeds up reading input compared to X3 (refresh mode). For differences between modes, refer to the user's manual (function explanation, program fundamentals) of the CPU module used.

(2) Processing time of dedicated instructions

The following table lists the operation processing time (rough standard) of each dedicated instruction.
The operation processing time differs slightly depending on the system configuration and communication protocol.

(a) For Basic model QCPU, High Performance model QCPU, Process CPU

Instruction name	Processing time (unit: ms)						Instruction execution condition		
	Other than CPUs shown on the right		Q02CPU		Q00J/Q00/Q01CPU		Transmission speed	Transmission/receive (registered) data count	Others
	QJ71C24N (-R2/R4)	QJ71C24 (-R2)	QJ71C24N (-R2/R4)	QJ71C24 (-R2)	QJ71C24N (-R2/R4)	QJ71C24 (-R2)			
ONDEMAND	48.0	51.5	48.6	52.2	49.7	53.6	19200 bps Data size: 8 Stop bit: 1 Parity: none	40 bytes	Send in form 3
OUTPUT	23.4	24.8	23.8	25.3	25.6	26.7		40 bytes	—
PRR	23.3	26.8	24.2	27.0	25.1	28.3		40 bytes * 8 bytes × 5 frames	—
INPUT	3.4	9.9	3.9	9.9	4.9	10.0	—	40 bytes	Execute instruction after 40 bytes have been received.
BIDOUT	28.6	47.0	30.5	47.1	32.6	49.6	—	40 bytes	—
BIDIN	26.4	29.1	27.6	29.9	29.8	31.7	—	40 bytes	—
PUTE	881.9	881.9	884.4	884.4	871.4	899.5	—	40 bytes	—
GETE	1.1	1.1	1.5	1.5	3.1	3.2	—	40 bytes	—
SPBUSY	0.1	0.1	0.2	0.2	0.3	0.3	—	—	—
CSET	1.0	1.2	1.6	1.7	3.4	3.9	—	—	Transmission/receipt buffer setting
BUFRCVS	0.3	0.3	0.5	0.5	—	—	19200 bps	40 bytes	—
UINI	416.1	—	417.5	—	418.3	—	—	—	—
CPRTCL	* Instruction processing time varies by external device and/or protocol.								

(b) For Universal model QCPU

Instruction name	Processing time (unit: ms)		Instruction execution condition		
	Other than Q02UCPU	Q02UCPU	Transmission speed	Transmission/receive (registered) data count	Others
ONDEMAND	48.0	48.6	19200 bps Data size: 8 Stop bit: 1 Parity: none	40 bytes	Send in form 3
OUTPUT	22.9	23.3		40 bytes	—
PRR	23.1	23.4		40 bytes * 8 bytes × 5 frames	—
INPUT	3.2	3.6	—	40 bytes	Execute instruction after 40 bytes have been received.
BIDOUT	28.6	29.3	—	40 bytes	—
BIDIN	26.2	27.0	—	40 bytes	—
PUTE	881.9	881.9	—	40 bytes	—
GETE	0.8	1.5	—	40 bytes	—
SPBUSY	0.1	0.2	—	—	—
CSET	0.9	1.8	—	—	Transmission/receipt buffer setting
BUFRCVS	0.2	0.4	19200 bps	40 bytes	—
UINI	415.2	416.8	—	—	—
CPRTCL	* Instruction processing time varies by external device and/or protocol.				

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Appendix 4 ASCII-Code Table

The ASCII-codes are listed in the table below. (7-bit code)
The codes 00H to 1FH marked ★ are used as Q series C24 control codes. (The DC codes 11H to 14H can be changed by the user.)

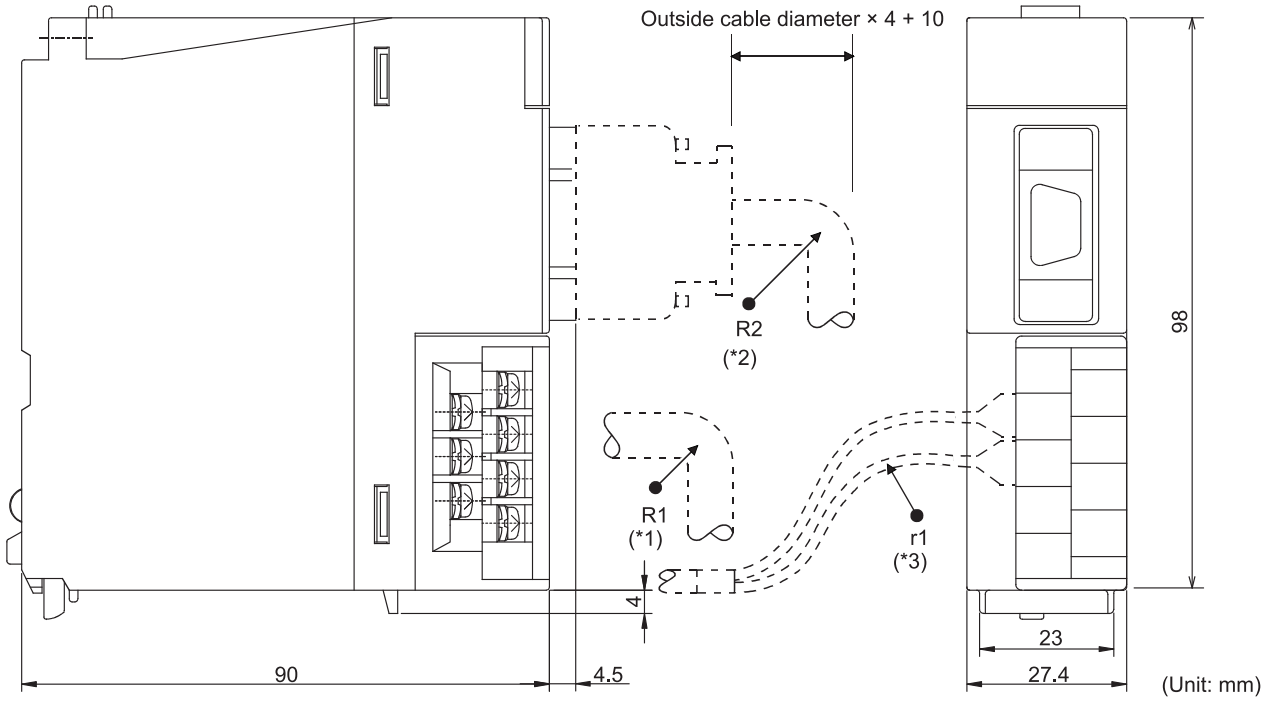
LSD \ MSD		0	1	2	3	4	5	6	7
		000	001	010	011	100	101	110	111
0	0000	NUL★	DLE★	SP	0	@	P	,	p
1	0001	SOH	DC1★	!	1	A	Q	a	q
2	0010	STX★	DC2★	"	2	B	R	b	r
3	0011	ETX★	DC3★	#	3	C	S	c	s
4	0100	EOT★	DC4★	$	4	D	T	d	t
5	0101	ENQ★	NAK★	%	5	E	U	e	u
6	0110	ACK★	SYN	&	6	F	V	f	v
7	0111	BEL	ETB	/	7	G	W	g	w
8	1000	BS	CAN	(	8	H	X	h	x
9	1001	HT	EM	)	9	I	Y	i	y
A	1010	LF★	SUB	*	:	J	Z	j	z
B	1011	VT	ESC	+	;	K	[	k	{
C	1100	FF★	FS	,	<	L	\	l	|
D	1101	CR★	GS	—	=	M	]	m	}
E	1110	SO	RS	.	>	N	↑	n	~
F	1111	SI	US	/	?	O	←	o	DEL

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Appendix 5 External Dimensions

(1) QJ71C24N, QJ71C24

The external dimensions of the QJ71C24 are almost the same as those of the QJ71C24N, except for the model name part and serial number plate.



*1: R1 (Bending radius near terminal block) : Outside cable diameter × 4

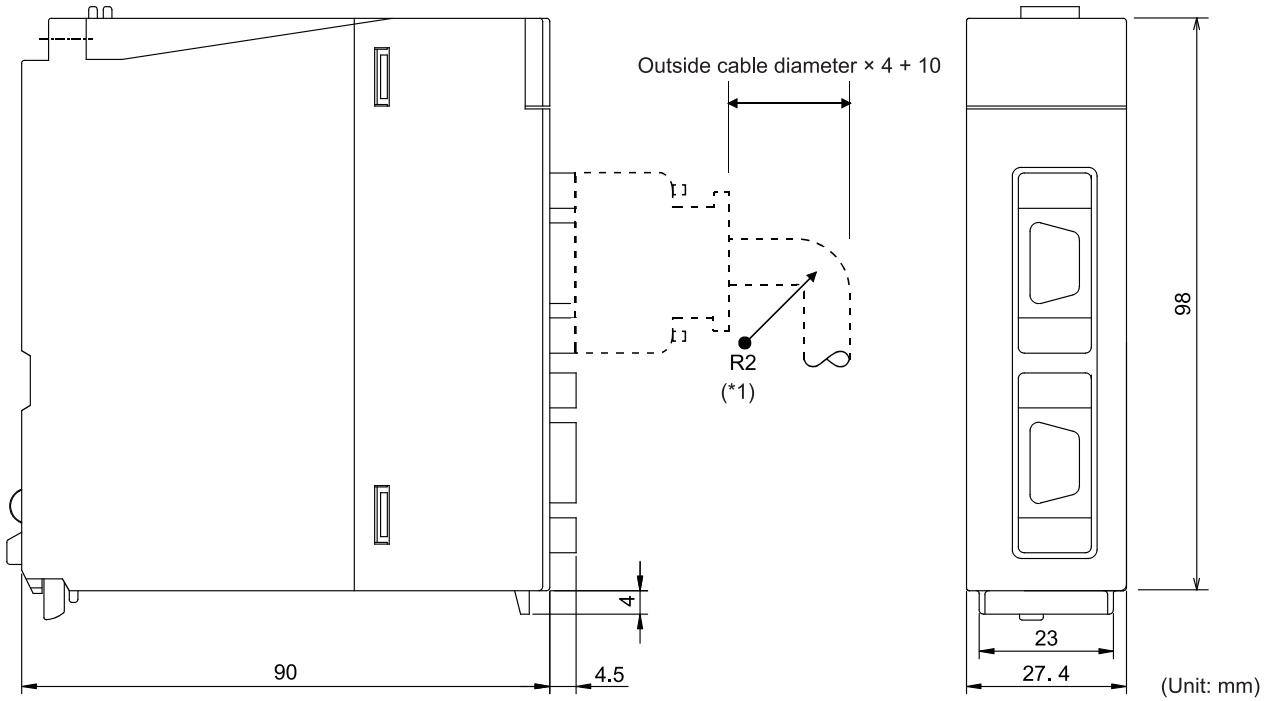
*2: R2 (Bending radius near connector) : Outside cable diameter × 4

*3: r1 (Bending radius near crimp contact) : Connectable as long as not bended extremely

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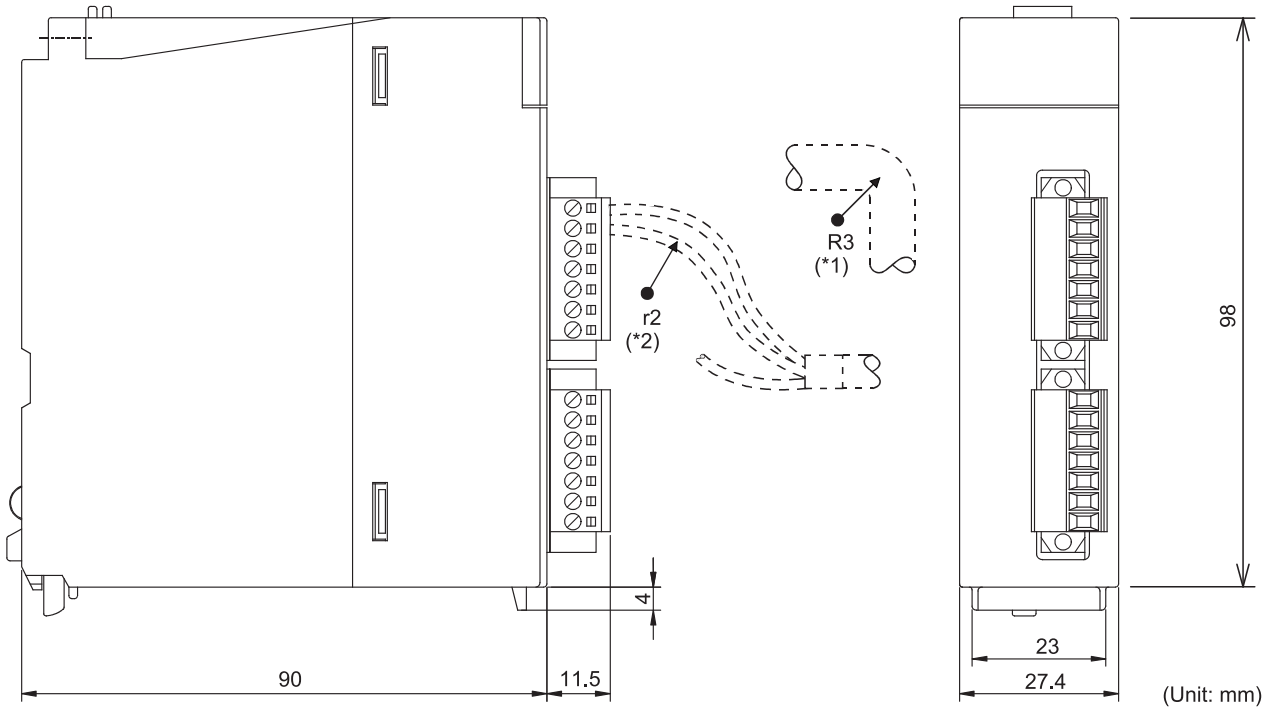
(2) QJ71C24N-R2, QJ71C24-R2

The external dimensions of the QJ71C24-R2 are almost the same as those of the QJ71C24N-R2, except for the model name part and serial number plate.



＊1: R2 (Bending radius near connector) : Outside cable diameter × 4

(3) QJ71C24N-R4



＊1: R3 (Bending radius near the plug-in socket block) : Outside cable diameter × 4

＊2: r2 (Bending radius near the wire connection) : Connectable as long as not bended extremely

Appendix 6 Interfaces

Appendix 6.1 RS-232 interfaces used for the Q series C24

The connectors listed below are used as RS-232 interface connectors.

Module model	First 6 digits of the serial number	Manufacturer	Model
QJ71C24N	Other than the following	DDK Ltd.	17L-10090-27(D9AC)(-FA)
	• 140112 to 170213 • First 4 digits are "1703" and the sixth digit is "3".	HIROSE Electric Co., Ltd.	RDED-9SE-LN(55)
QJ71C24N-R2	Other than the following	DDK Ltd.	17L-10090-27(D9AC)(-FA)
	• 140111 to 170218 • First 4 digits are "1703" and the sixth digit is "8".	HIROSE Electric Co., Ltd.	RDED-9SE-LN(55)

Appendix 6.2 Connection examples when using a converter

This section provides connection examples where an RS-232 to RS-422/485 converter is used in order to communicate data using data communication functions with the MC, non-procedure, or bidirectional protocol.

The converters covered in this Appendix are as follows:

Manufacturer	Model name (Recommended product)	Contact
EL Engineering Ltd.	EL-LINE-II	Funato-cho 7-16, Nakagawa-ku, Nagoya, 454-0805 Tel: (052) 361-2290 Fax: (052) 363-1050
System Sacom Co., Ltd.	KS-1 KS-10P KS-485	www.sacom.co.jp

* The recommended products have been verified and satisfy our criteria. When using any of these products, use it so that it conforms to the recommended product's specifications (standards).

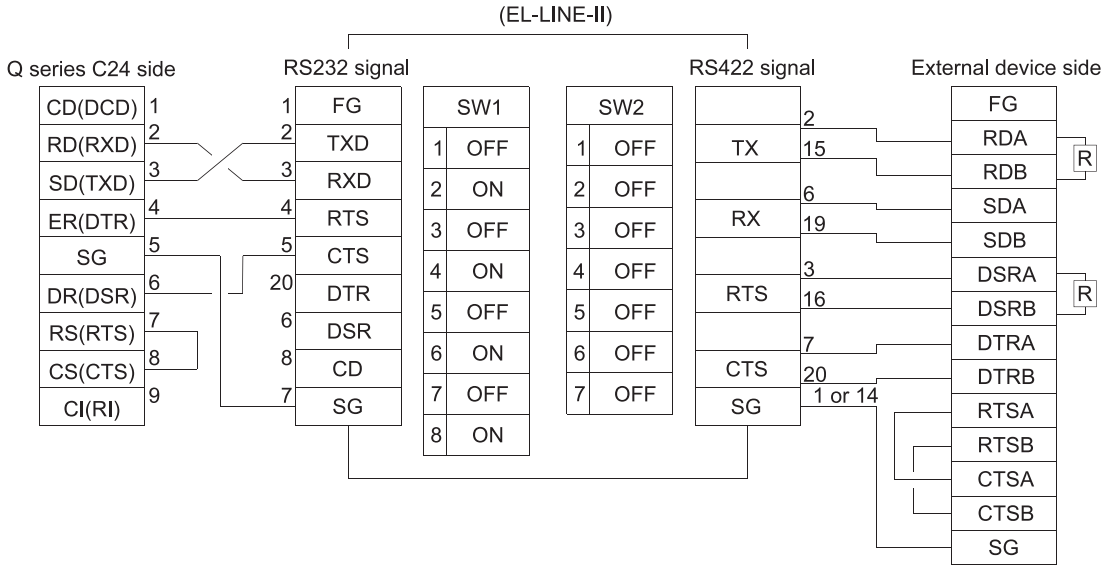
(1) Combination between available converters and interfaces

Q series C24 side connection interface	System configuration with external devices	External device interface	Available converter	Description No. of connection example
RS-232	1:1	RS-422	EL-LINE-II	Connection example 1
			KS-1 KS-10P	Connection example 2
		RS-485	KS-485	Connection example 3
RS-422/485	1:1, 1:n, m:n	RS-232	KS-485	Connection example 4

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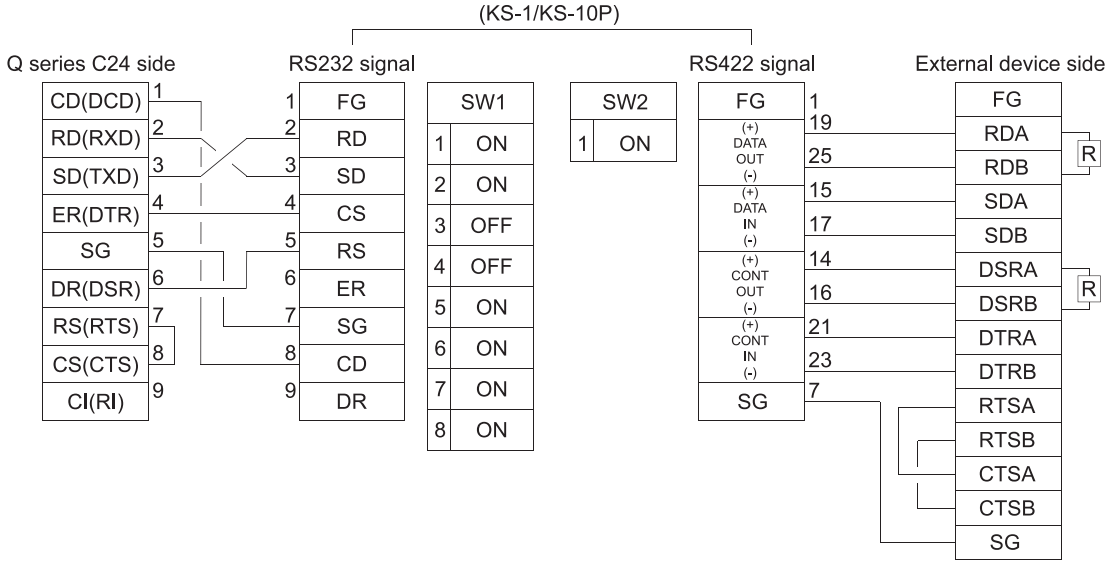
(2) Connection example

(Connection example 1)



* • The CD terminal check setting should be set to "No check" according to the explanation in Section 3.2.1 (1).
  • DC code control or DTR/DSR control becomes possible for transmission control.

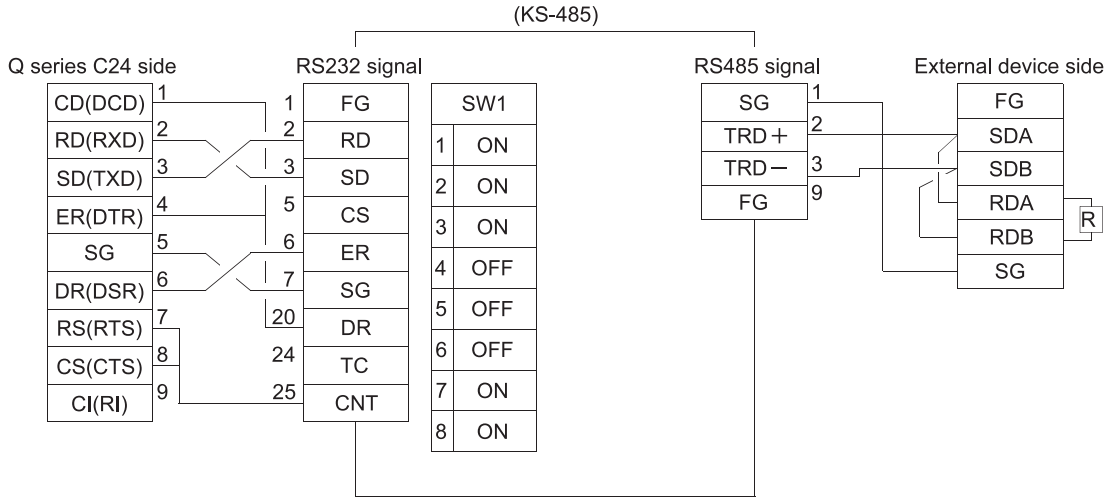
(Connection example 2)



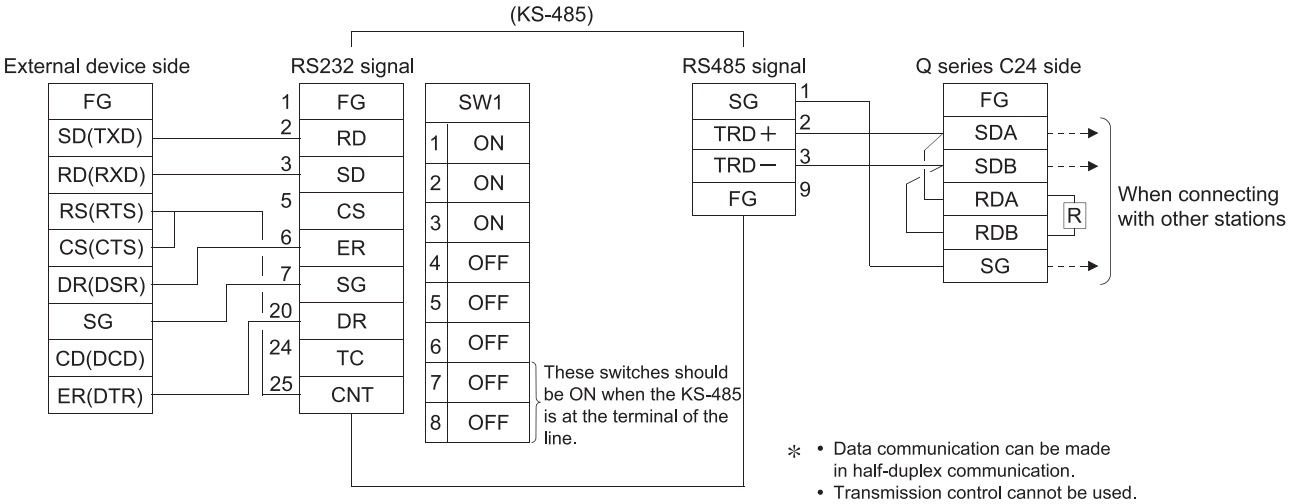
* • The CD terminal check setting should be set to "No check" according to the explanation in Section 3.2.1 (1).
  • DC code control or DTR/DSR control becomes possible for transmission control.

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(Connection example 3)



(Connection example 4)



* • Data communication can be made in half-duplex communication.
  • Transmission control cannot be used.

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Appendix 7 Communication Support Tool (MX Component)

MX Component is an ActiveX control library that supports any types of communication paths between IBM PC/AT compatible personal computers and programmable controllers. It allows the users to establish using simple processing only, without having to know about the different communication protocols used in the individual communication.
It also supports various programming languages, allowing for a wide range of application development.

This section provides the overview of the functions provided by MX Component and explains the procedure up to creation of applications.
* See Operating Manual and Programming Manual of MX Component for the details.

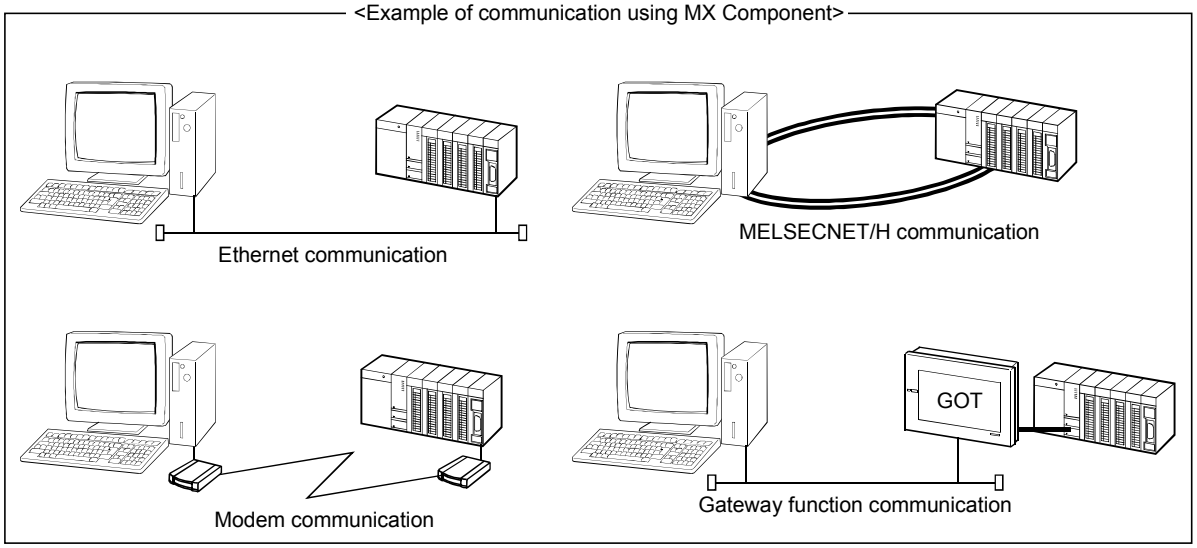
Appendix 7.1 Overview of MX Component

This section provides the overview of MX Component.
Different communication paths, operating systems, programming languages, and functions are supported depending on the version of MX Component used.

(1) Support for a wide range of communication paths to programmable controllers

MX Component supports a wide range of communication paths to programmable controllers. It is possible to construct systems according to the needs of the users.

<Example of communication using MX Component>



(2) Dramatic improvement of application development efficiency

MX Component provides wizard-style communication setting utilities.
The user only needs to select settings from menus displayed on the screen in an interactive manner to achieve the communication settings required to access the target programmable controller CPU.
Moreover, once the communication setting has been performed, it is possible to access the programmable controller CPU simply by specifying the logical station number that is stored via the communication setting utilities.

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(3) Support for wide choice of basic operating systems

MX Component can be used on a personal computer with Microsoft® Windows® . For operating systems that support MX Component, refer to the operating manual for MX Component.

(4) Support for a wide variety of programming languages

MX Component supports the following programming languages. It allows the user to develop a wide range of customized applications.

Programming language	Development software
Visual Basic®	Microsoft® Visual Basic® 6.0, Microsoft® Visual Basic® .NET 2003, Microsoft® Visual Studio 2005 Visual Basic® , Microsoft® Visual Studio 2008 Visual Basic®
Visual C++®	Microsoft® Visual C++® 6.0, Microsoft® Visual C++® .NET 2003, Microsoft® Visual Studio 2005 Visual C++® , Microsoft® Visual Studio 2008 Visual C++®
VBScript	Text editors and commercially available HTML tools
VBA	Microsoft® Excel 2000, Microsoft® Excel 2002, Microsoft® Excel 2003, Microsoft® Excel 2007, Microsoft® Access 2000 or Microsoft® Access 2002, Microsoft® Access 2003, Microsoft® Access 2007

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(5) Support for functions dedicated for data communication with programmable controllers

MX Component provides the functions necessary for data communication with programmable controllers, including functions for opening/closing communication lines and reading/writing devices.

Multi-function communication programs can thus easily be developed with MX Component.

Function name	Function
Connect	Connects a telephone line.
Open	Opens a communication line.
Close	Closes a communication line.
Disconnect	Disconnects a telephone line.
GetErrorMessage	Displays error definition and corrective action.
ReadDeviceBlock	Batch-reads data from devices. (LONG type)
WriteDeviceBlock	Batch-writes data to devices. (LONG type)
ReadDeviceBlock2	Batch-reads data from devices. (SHORT type/INT type)
WriteDeviceBlock2	Batch-writes data to devices. (SHORT type/INT type)
ReadDeviceRandom	Randomly reads data from devices. (LONG type)
WriteDeviceRandom	Randomly writes data to devices. (LONG type)
ReadDeviceRandom2	Randomly reads data from devices. (SHORT type/INT type)
WriteDeviceRandom2	Randomly writes data to devices. (SHORT type/INT type)
SetDevice	Sets one device. (LONG type)
GetDevice	Acquires the data of one device. (LONG type)
SetDevice2	Sets one device. (SHORT type/INT type)
GetDevice2	Acquires data of one device. (SHORT type/INT type)
ReadBuffer	Reads from buffer memory.
WriteBuffer	Writes to buffer memory.
GetClockData	Reads clock data from programmable controller CPU.
SetClockData	Writes clock data to programmable controller CPU.
GetCpuType	Reads a programmable controller CPU type.
SetCpuStatus	Remote RUN/STOP/PAUSE of programmable controller CPU.
EntryDeviceStatus	Registers device status monitor.
FreeDeviceStatus	Deregisters device status monitor.
OnDeviceStatus	Announces event.

For details of the functions, refer to the MX Component Programming Manual.

(6) Collecting data on Excel without programming

Using MX Component and MX Sheet (SWnD5C-SHEET-E) allows users to collect programmable controller device data on Excel with only simple setting and without any programming.

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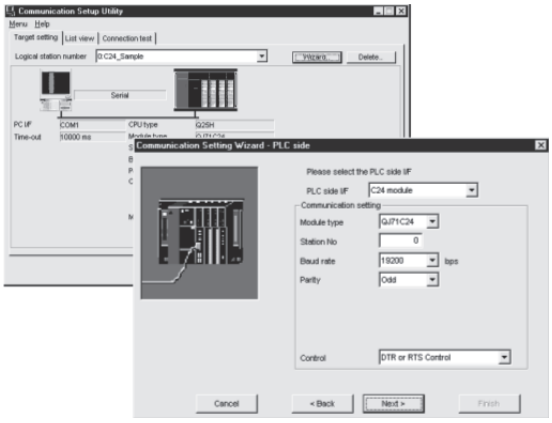
Appendix 7.2 Usage procedure of MX Component

This section explains the procedure for creating programs and sample programs using MX Component.

(1) Procedure for creating programs

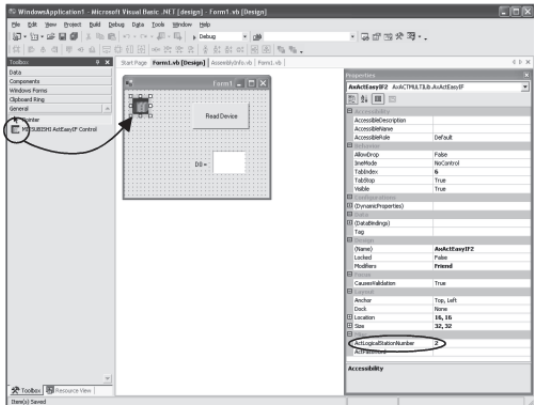
The procedure for creating programs is outlined below.

The usage procedure below uses Visual Basic® .NET 2003 as an example.



↓

1) Perform the communication settings from a IBM PC/AT compatible personal computer to the programmable controller by following the wizard. (Some types of controls are set only by programs without using the wizard.)
The wizard allows the user to perform the settings required for the communication such as logical station number, connected module type, and programmable controller to be connected.



↓

2) Paste the ACT control icon onto the form and assign the logical station number set in step 1 to the property of the pasted control.

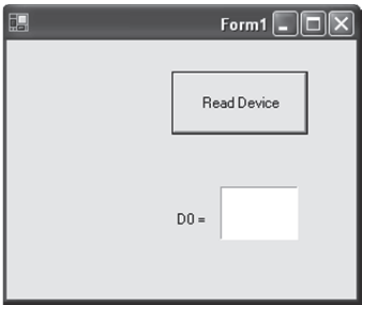
```
Private Sub Button1_Click(ByVal sender As System.Obj
    Dim rtn As Integer
    Dim iData As Integer
    rtn = AxActEasyIF1.Open()

    rtn = AxActEasyIF1.GetDevice("D0", iData)
    Label1.Text = iData

End Sub
```

↓

3) Use the functions provided by the software to write a program that reads the device data.



Completed

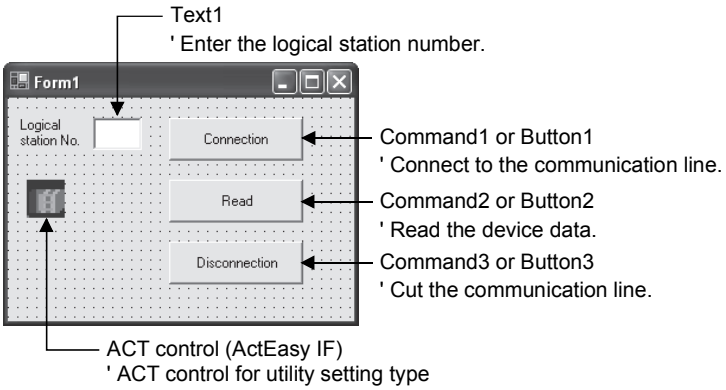
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(2) Sample program

The following sample program reads D0 to D4 (five points) of the target programmable controller using the logical station number.

(a) When Visual Basic® is used

1) Screen example (Form1)



(b) Program example

For each development software, the program examples are described below.

1) Visual Basic® .NET 2003
2) Visual C++® .NET 2003
3) Visual Basic® 6.0
4) Visual C++® 6.0

1) When Visual Basic® .NET 2003 is used

```
Private Sub Command1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Command1.Click
'************************************
'    Connection
'************************************
Dim rtn As Integer

    'Get LogicalstationNumber
    AxActEasyIF1.ActLogicalStationNumber = Val(Text1.Text)

    'Connection
    rtn = AxActEasyIF1.Open()
    If rtn = 0 Then
        MsgBox("The connection was successful")
    Else
        MsgBox("Connection Error :" & Hex(rtn))
    End If

End Sub
```

```
Private Sub Command2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Command2.Click
'************************************
'    Read
'************************************
Dim rtn As Integer
Dim idata(5) As Short

    'D0-D4 are read
    rtn = AxActEasyIF1.ReadDeviceBlock2("D0", 5, idata(0))
    If rtn = 0 Then
        MsgBox("D0-D4 = " & idata(0) & "," & idata(1) & "," & idata(2) & "," & idata(3) & "," & idata(4))
    Else
        MsgBox("Read Error :" & Hex(rtn))
    End If

End Sub

Private Sub Command3_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Command3.Click
'************************************
'    Disconnection
'************************************
Dim rtn As Integer

    'Disconnection
    rtn = AxActEasyIF1.Close()
    If rtn = 0 Then
        MsgBox("The disconnection was successful")
    Else
        MsgBox("Disconnection Error :" & Hex(rtn))
    End If

End Sub
```

2) When Visual C++® .NET 2003 is used

```
//**************************
//          Connection
//**************************
private: System::Void button1_Click(System::Object *    sender, System::EventArgs *    e)
{
    int iRet;

    //   Get LogicalstationNumber
    axActEasyIF1->ActLogicalStationNumber=Convert::ToInt32(textBox1->Text);

    // Connection
    iRet = axActEasyIF1->Open();
    if( iRet == 0 ){
        MessageBox::Show( "The connection was successful" );
        } else {
        MessageBox::Show( String::Format( "Connection Error:0x{0:x8} [HEX]", __box(iRet) ) );
        }
}
```

```
//**************************
//            Read
//**************************
private: System::Void button2_Click(System::Object *    sender, System::EventArgs *    e)
{
        int iRet;
        short sData[5];
        String* szMessage= "";
        String* lpszarrData[];
        int iNumber;
        String* szReadData;

        // D0-D4 are read
        iRet = axActEasyIF1->ReadDeviceBlock2( "D0", 5, sData );
        if( iRet == 0 ){
                lpszarrData = new String * [ 5 ];
                lpszarrData[0] = "D0-D4 = ";

                // Storage of data to display the results
                for( iNumber = 0 ; iNumber < 5 ; iNumber++ )
                {
                        lpszarrData[ iNumber ] = sData[ iNumber ].ToString();
                }
                szReadData = String::Join(",",lpszarrData);
                MessageBox::Show(String::Format("D0-D4 = {0}",szReadData));
        } else {
                MessageBox::Show( String::Format( "Read Error:0x{0:x8} [HEX]", __box(iRet) ) );
        }
}

//**************************
//            Disconnection
//**************************
private: System::Void button3_Click(System::Object *    sender, System::EventArgs *    e)
{
        int iRet;

        // Disconnection
        iRet = axActEasyIF1->Close();
        if( iRet == 0 ){
                MessageBox::Show( "The disconnection was successful" );
        } else {
                MessageBox::Show( String::Format( "Disconnection Error:0x{0:x8} [HEX]", __box(iRet) ) );
        }
}
```

3) When Visual Basic® 6.0 is used

```
Private Sub Command1_Click()
'************************************
'    Connection
'************************************
Dim rtn As Long

    'Get LogicalstationNumber
    ActEasyIF1.ActLogicalStationNumber = Val(Text1.Text)

    'Connection
    rtn = ActEasyIF1.Open()
    If rtn = 0 Then
        MsgBox "The connection was successful"
    Else
        MsgBox "Connection Error :" & Hex(rtn)
    End If

End Sub

Private Sub Command2_Click()
'************************************
'    Read
'************************************
Dim rtn As Long
Dim idata(5) As Integer

    'D0-D4 are read
    rtn = ActEasyIF1.ReadDeviceBlock2("D0", 5, idata(0))
    If rtn = 0 Then
        MsgBox "D0-D5 = " & idata(0) & "," & idata(1) & "," & idata(2) & "," & idata(3) & "," & idata(4)
    Else
        MsgBox "Read Error :" & Hex(rtn)
    End If

End Sub

Private Sub Command3_Click()
'************************************
'    Disconnection
'************************************
Dim rtn As Long

    'Disconnection
    rtn = ActEasyIF1.Close()
    If rtn = 0 Then
        MsgBox "The disconnection was successful"
    Else
        MsgBox "Disconnection Error :" & Hex(rtn)
    End If

End Sub
```

4) When Visual C++® 6.0 is used

```
//**************************
//          Connection
//**************************
void CVCDlg::OnOpen()
{
        long lRet;
        CString szMessage;

        // Reflects the logical station No. set in the text box to variables.
        UpdateData();

    //  Get LogicalstationNumber
        m_actEasyIf.SetActLogicalStationNumber( m_lLogicalStationNumber );

    // Connection
        lRet = m_actEasyIf.Open();
        if( lRet == 0 ){
            MessageBox( "The connection was successful" );
        } else {
            szMessage.Format( "Connection Error : %x", lRet );
            MessageBox( szMessage );
        }
}

//**************************
//          Read
//**************************
void CVCDlg::OnRead()
{
        long lRet;
        short sData[5];
        CString szMessage;

    // D0-D4 are read
        lRet = m_actEasyIf.ReadDeviceBlock2( "D0", 5, sData );
        if( lRet == 0 ){
            szMessage.Format( "D0-D5 = %d,%d,%d,%d,%d",
                        sData[0],sData[1],sData[2],sData[3],sData[4] );
            MessageBox( szMessage );
        } else {
            szMessage.Format( "Read Error : %x", lRet );
            MessageBox( szMessage );
        }
}
```

```
//***************************
//              Disconnection
//***************************
void CVCDlg::OnClose()
{
              long lRet;
              CString szMessage;

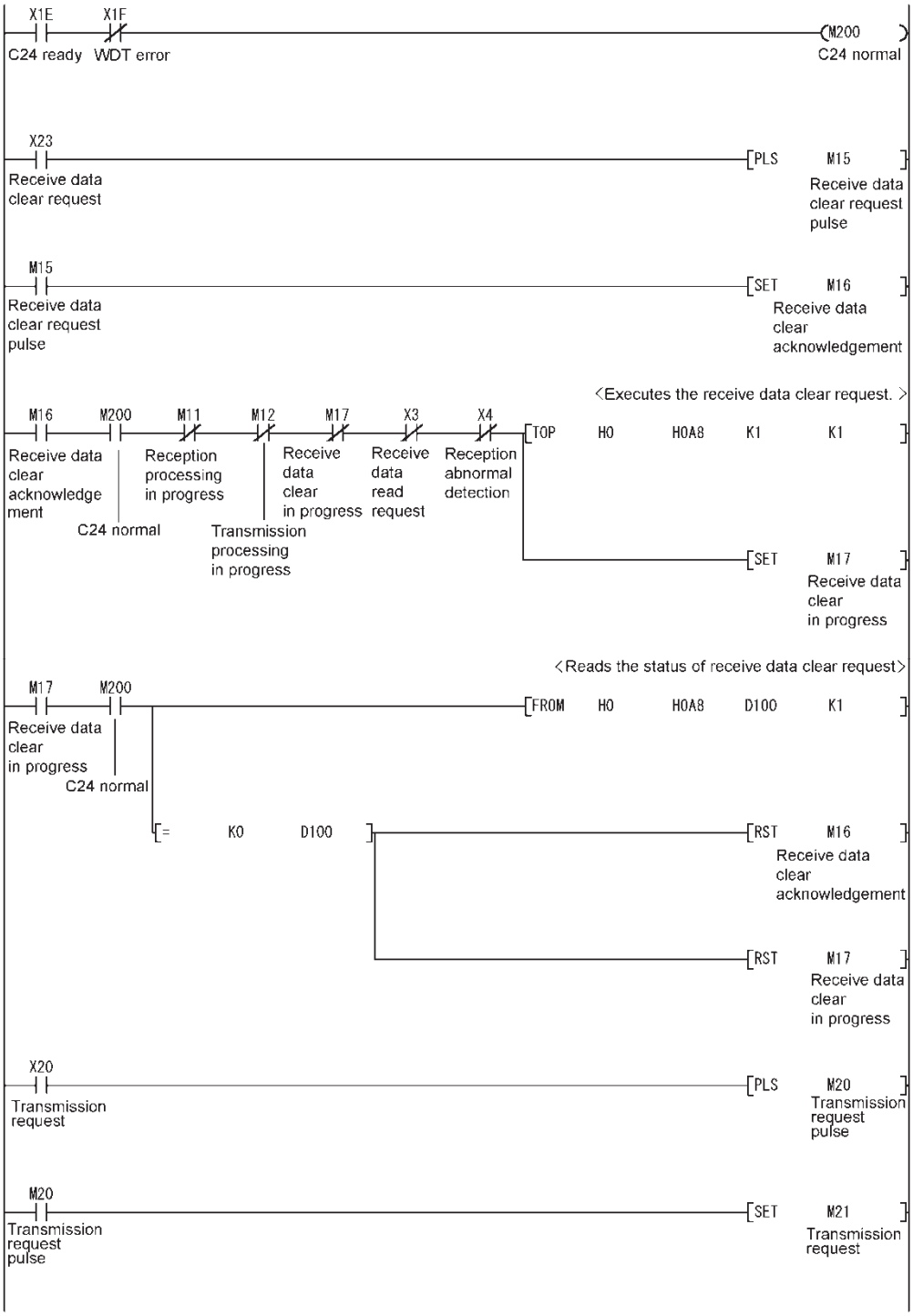
       // Disconnection
              lRet = m_actEasyIf.Close();
              if( lRet == 0 ){
                     MessageBox( "The disconnection was successful" );
              } else {
                     szMessage.Format( "Disconnection Error : %x", lRet );
                     MessageBox( szMessage );
              }
}
```

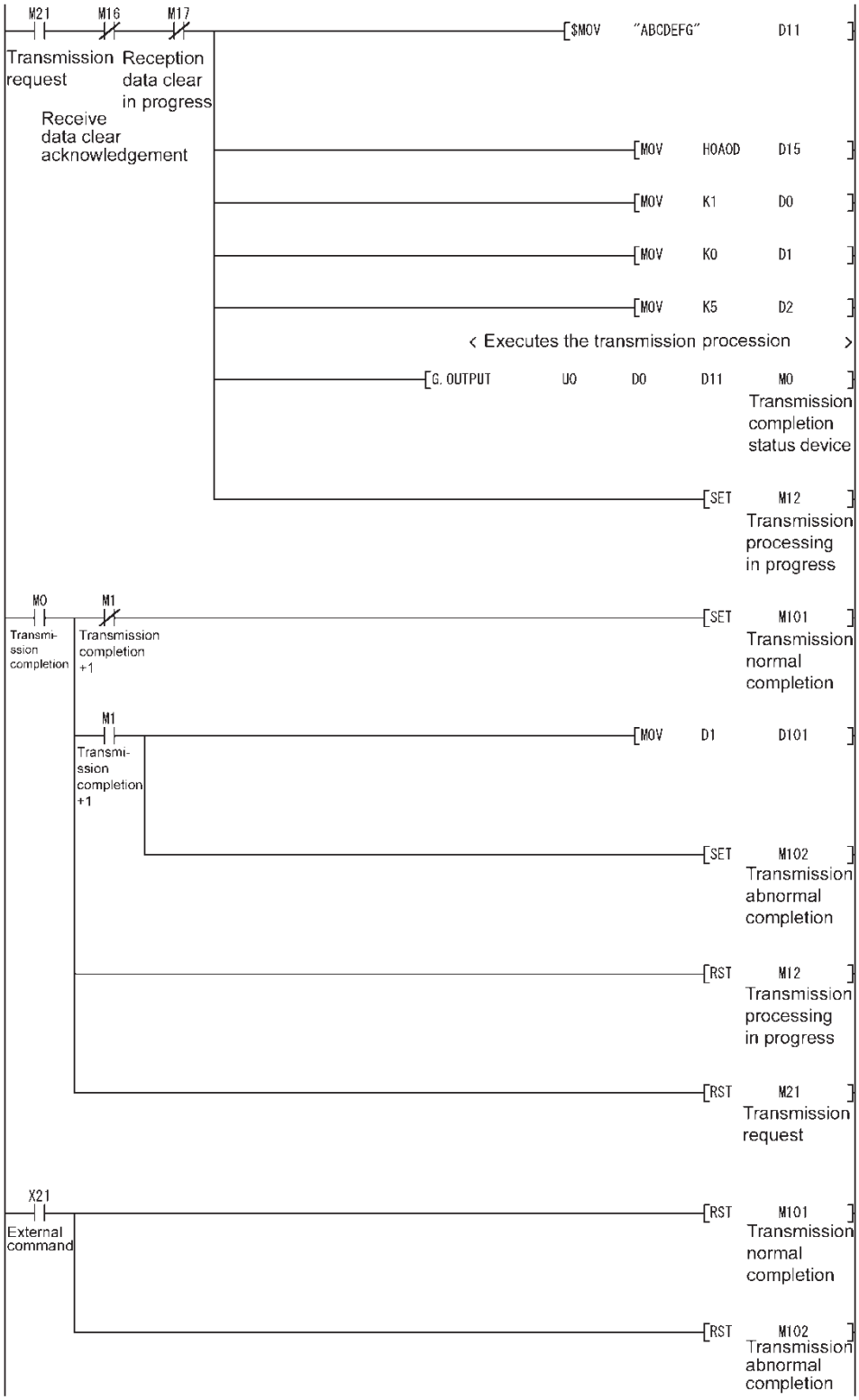

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Appendix 8 Example of Clear Process Program for Receive Data

When performing data communications with non procedure protocol, use the receive data clear request shown in 6.1.4. and display the sequence program example if clearing the receive data from external device. (If the Q series C24 input/output signal is X/Y000 to X/Y01F.)

The following I/O signals (X) and internal relays (M) are used in the program.





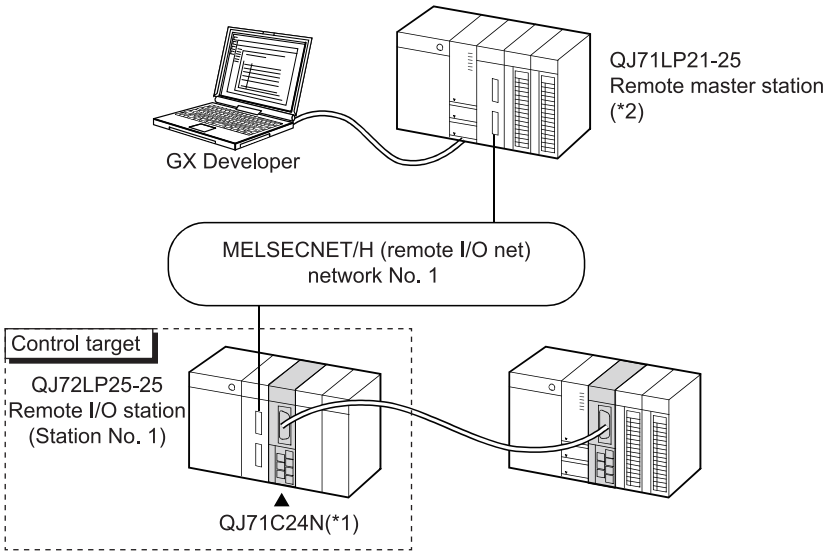
POINT
When a function version A for the Q series C24 is used, add the partial circuit (with a mark of ＊1) shown in the program example in Section 6.1.4 (3). (Communications are possible when M19 is ON.)

Appendix 9 Program Examples for Using Q Series C24 at MELSECNET/H Remote I/O Station

Appendix 9.1 System configuration and program conditions

(1) System configuration

The system configuration used in the program examples of this section is shown below.



∗1 It is assumed that the QJ71C24N is mounted on Slot 0 of the base unit and the starting I/O No. is "0".

∗2 Set the network parameters of the remote master station as below.

1) Network type : MNET/H (Remote master)
2) Starting I/O No. : 0000H
3) Network No. : 1
4) Total stations : 1
5) Mode : Online
6) Network range assignment (XY setting)

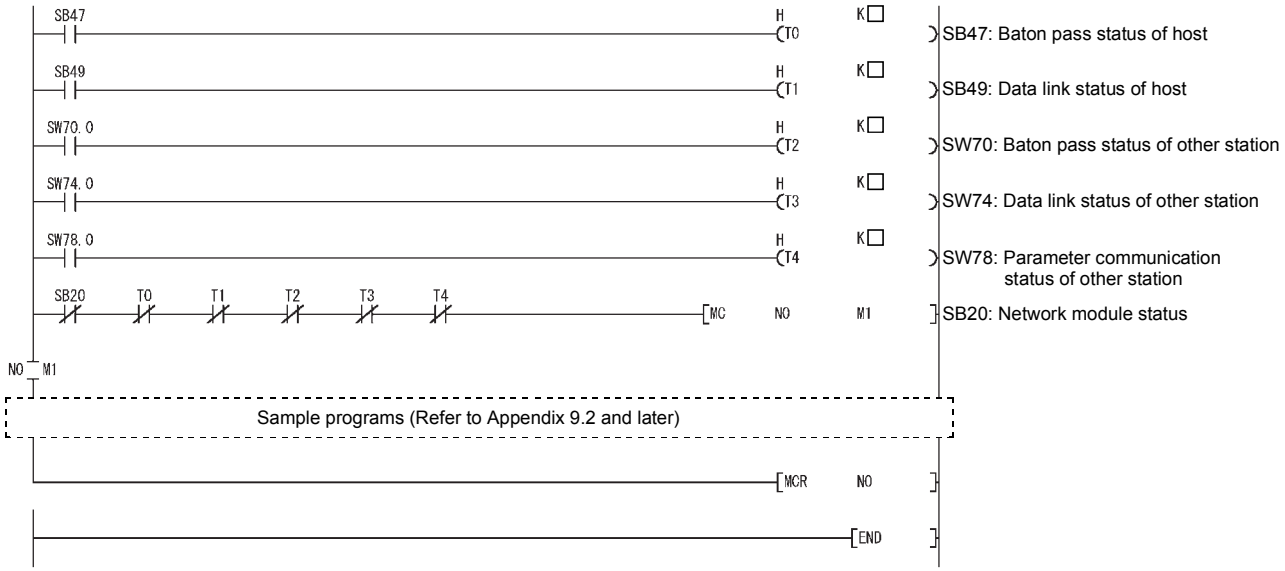
StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	64	1000	103F	64	0000	003F	64	1000	103F	64	0000	003F

7) Refresh parameters

	Link side					PLC side			
	Dev. name	Points	Start	End		Dev. name	Points	Start	End
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF
Random cyclic	LB				↔				
Random cyclic	LW				↔				
Transfer1	LX	64	1000	103F	↔	X	64	1000	103F
Transfer2	LY	64	1000	103F	↔	Y	64	1000	103F
Transfer3					↔				
Transfer4					↔				
Transfer5					↔				
Transfer6					↔				

(2) Program example for interlocking the remote master station and remote I/O station

Interlocks should be applied to the programs according to the link status of the remote master station (host station) and remote I/O station (other station).
The following example shows an interlock in the communication program that uses the link status (SB47, SB49) of the remote master station and the link status (SW70 bit 0, SW74 bit 0, SW78 bit 0) of the remote I/O station (Station No. 1).



Set the following values for the timer constant K□.

Baton pass status (T0, T2)	More than (sequence scan time × 4)
Cyclic transmission status Parameter communication status (T1, T3, T4)	More than (sequence scan time × 3)

Reason: Not to stop the control even if the network detects an instantaneous error due to a faulty cable condition or noise interference.
Also, the multipliers of 4 and 3 should only be considered as a guideline.

(3) REMFR/REMTO instruction

Perform programming so that the next instruction is executed after the REMFR/REMTO instruction is executed and then completed.
The completion of the REMFR/REMTO instruction can be confirmed by the completion device.

POINT

(1) After the execution of the REMFR/REMTO instruction, several scans are required before the read/write of the actual data is completed.
(2) For the interlock program for the remote master station and remote I/O station of the MELSECNET/H and details of the REMFR/REMTO instruction, refer to the "Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network)".

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Appendix 9.2 When accessing buffer memory using sequence program

In the following program example, data are read from or written to the buffer memory of the Q series C24 using the REMFR/REMTO instruction.

POINT

Use GX Configurator-SC to change the default value of the buffer memory. Using GX Configurator-SC, save the new setting value to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

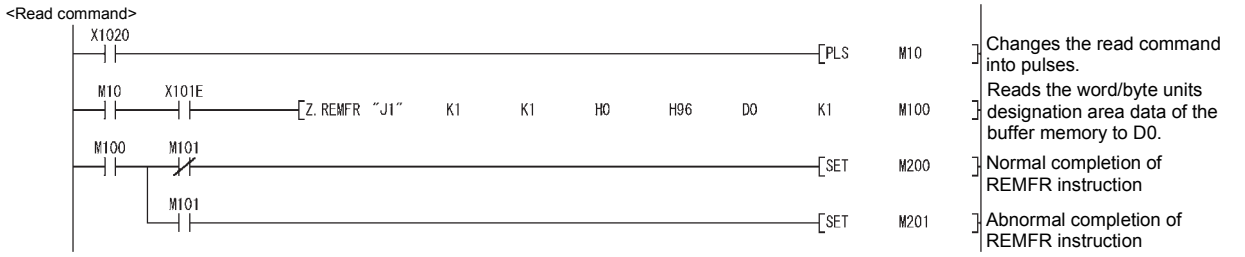
The following program reads data from or writes data to the QJ71C24N buffer memory (CH1 side word/byte units designation area) when the read/write command (X1020, X1021) turns ON.

(a) Devices used:

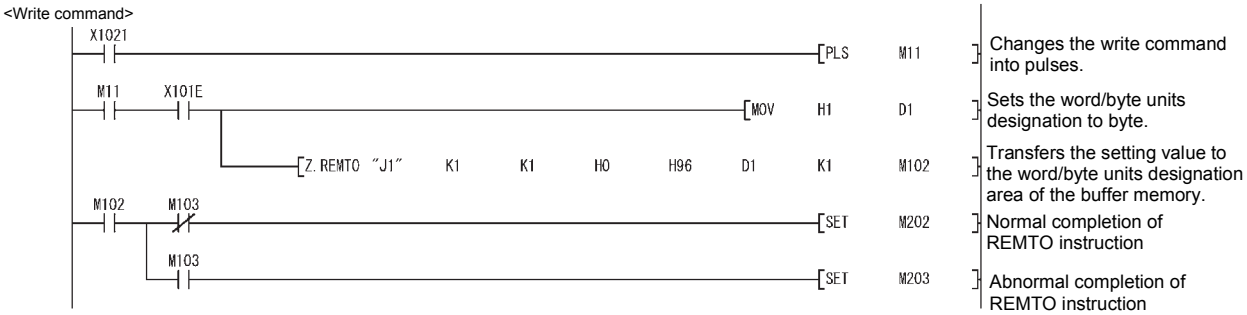
- Read/write command X1020, X1021
- Read/write command pulse signal..... M10, M11
- Completion device for REMFR/REMTO instruction..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 203
- Read from word/byte units designation area..... D0
- Write to word/byte units designation area D1

(2) Program examples

(a) Read from buffer memory



(b) Write to buffer memory



Appendix 9.3 When sending on-demand data

The following program example sends on-demand data using the REMFR/REMTO instruction and I/O signals.
For the on-demand function, refer to the Reference Manual and the User's Manual (Application).

(1) Program conditions

The following program sends on-demand data from the CH1 side when the transmission command (X1022) turns ON.

(a) Devices used:

- Transmission command X1022
- Transmission command pulse signal M10
- On-demand function designation command M11
- On-demand data transmission flag M12
- On-demand execution result acquisition command M13
- LED ON status acquisition command M14
- Completion device for REMFR/REMTO instruction ..... M100 to 107
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 204
- Normal/abnormal completion of on-demand data transmission M300, M301
- Transmission data D0, D1
- Buffer memory head address designation for on-demand function D2
- Data length designation for on-demand function D3
- On-demand execution result D8
- LED ON status and communication error status on CH1 side D9

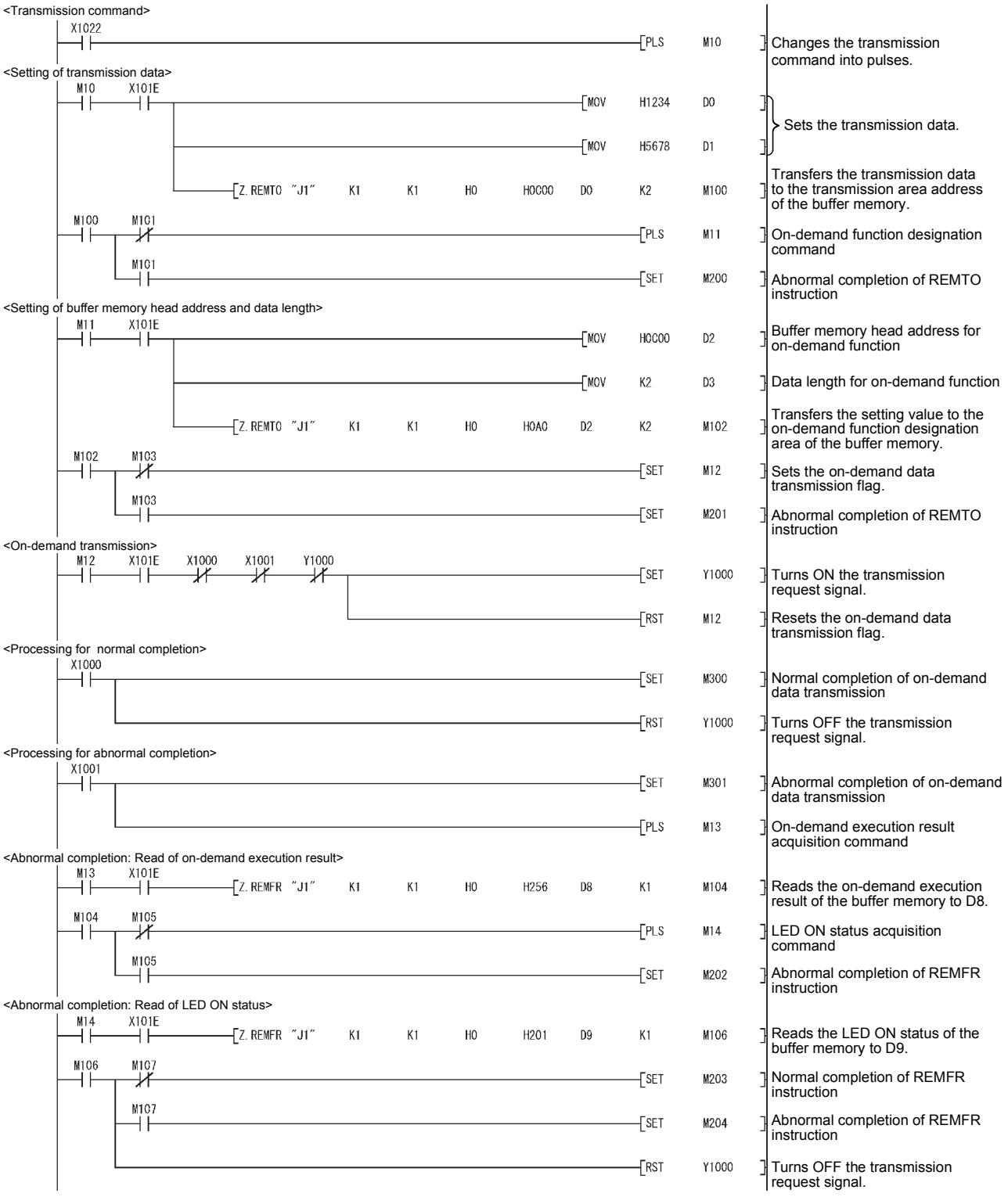
(b) Intelligent function module switch settings (Refer to Section 4.5.2.)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07E2H
	b1	ON		Data bit	8 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	ON		Sum check code	Yes	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		MC protocol format 1	0001H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Word units
160 (A0H)	Buffer memory head address designation for on-demand function designation	0C00H
161 (A1H)	Data length designation for on-demand function designation	2
513 (201H)	LED ON status and communication error status on CH1 side	—
598 (256H)	On-demand execution result	—

(2) Program example



Appendix 9.4 When receiving data using nonprocedural or bidirectional protocol

The following program example receives data under the nonprocedural protocol (or bidirectional protocol) using the REMFR instruction and I/O signals.
Refer to Chapter 6 for the communication using the nonprocedural protocol.
Refer to Chapter 7 for the communication using the bidirectional protocol.
Refer to the User's Manual (Application) for data communication using the user frames.

(1) Program conditions

The following program receives data from the external device by communication using the nonprocedural protocol, then turns ON the reception data request (X1003), and reads the received data from the QJ71C24N buffer memory to the programmable controller CPU.

(a) Devices used:

- Error code read signal X1023
- Receive read request signal M10
- Received data acquisition command M11
- Receive result acquisition command M12
- Completion device for REMFR instruction ..... M100 to 105
- Normal/abnormal completion flag for REMFR instruction ... M200 to 203
- Normal/abnormal completion of receive M300, M301
- Received data count D0
- Received data (when 5-word data are received) ..... D1 to D5
- Data reception result D8000

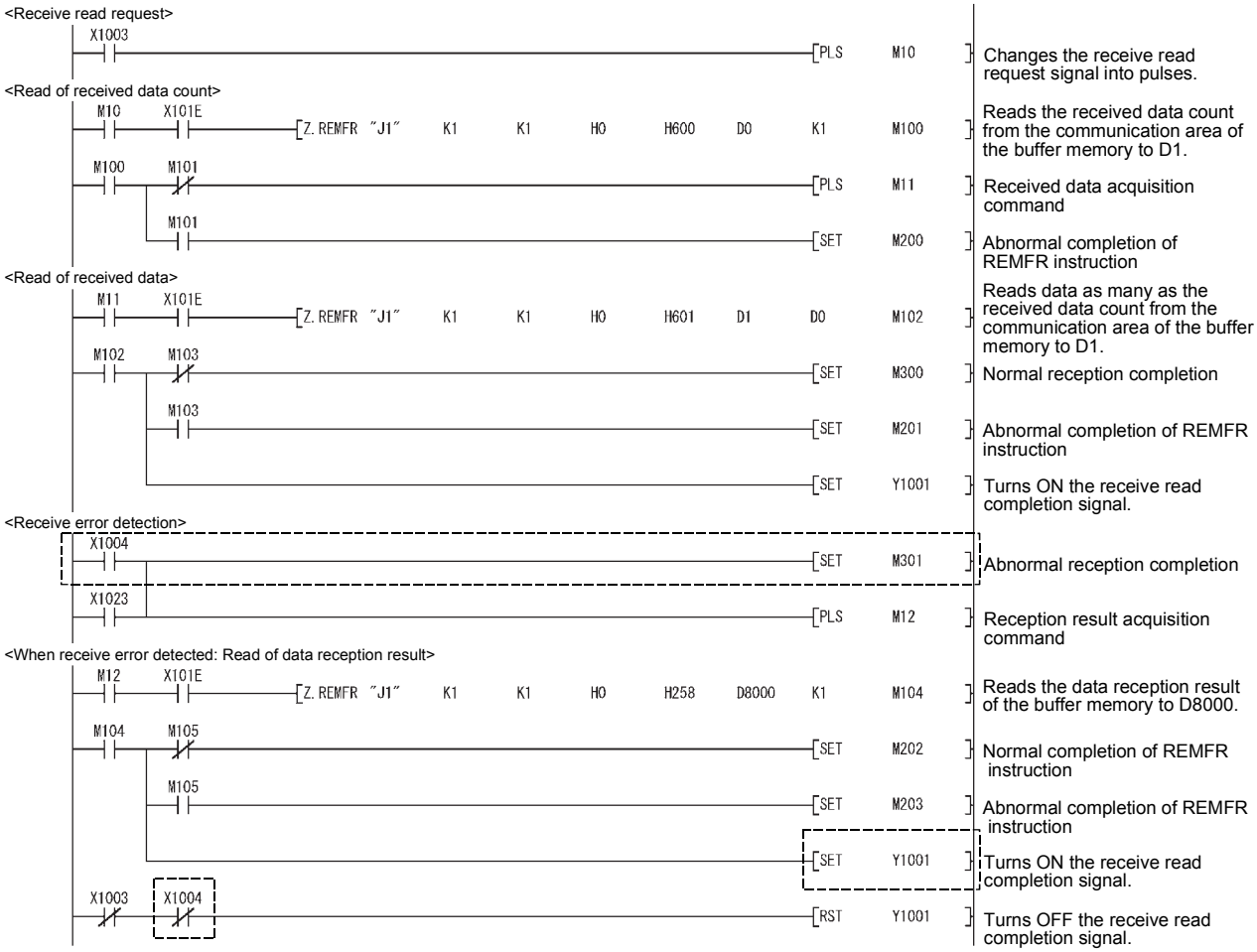
(b) Intelligent function module switch settings (Refer to Section 4.5.2.)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C0H
	b1	OFF		Data bit	7 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol	0006H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Word units
164 (A4H)	Received data count designation	01FFH
165 (A5H)	Receive complete code designation	0D0AH
166 (A6H)	Receive buffer memory head address designation	0600H
167 (A7H)	Receive buffer memory length designation	0200H
600 (258H)	Data reception result	—

(2) Program example



REMARKS

When data reception is executed by the bidirectional protocol, the area enclosed by the dotted line shown above must be removed.

Set the intelligent function module switches as indicated below. (Refer to Section 4.5.2.)

Switch No.	Setting value
Switch 1	$07C0_H$
Switch 2	0007_H

Appendix 9.5 When sending data using nonprocedural or bidirectional protocol

The following program example sends data under the nonprocedural protocol (or bidirectional protocol) using the REMFR/REMTO instruction and I/O signals.
Refer to Chapter 6 for the communication using the nonprocedural protocol, and to Chapter 7 for the communication using the bidirectional protocol.

(1) Program conditions

The following program sends data from the CH1 side when the transmission signal (X1024) turns ON.

(a) Devices used:

- Transmission command X1024
- Transmission command pulse signal M10
- Transmission result acquisition command M11
- Completion device for REMFR/REMTO instruction ..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 202
- Normal/abnormal completion of transmission M300, M301
- Transmission data count D10
- Transmission data (5 words) ..... D11 to D15
- Data transmission result D20

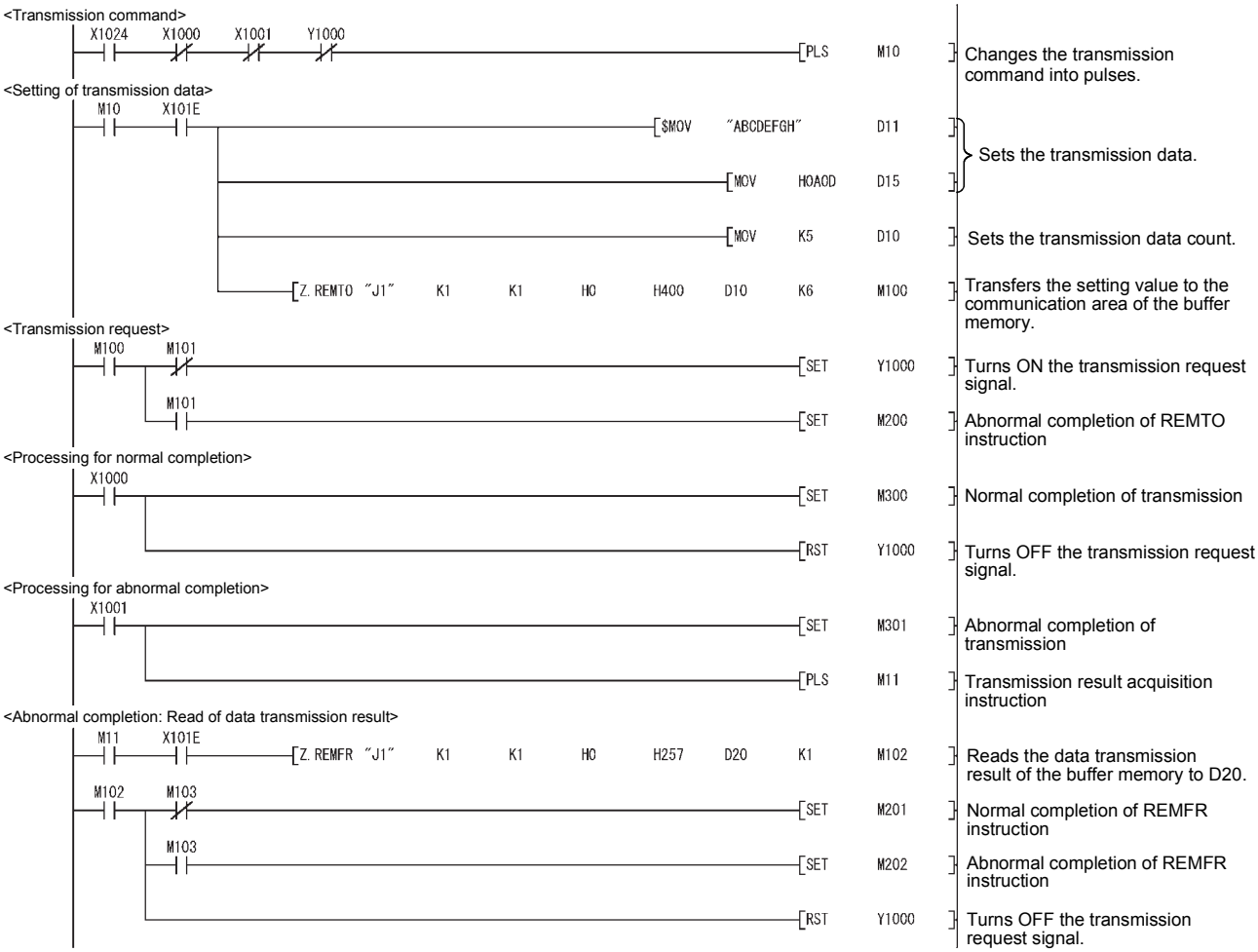
(b) Intelligent function module switch settings (Refer to Section 4.5.2.)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C0H
	b1	OFF		Data bit	7 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol or bidirectional protocol	0006H or 0007H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Word units
162 (A2H)	Transmission buffer memory head address designation	0400H
163 (A3H)	Transmission buffer memory length designation	0200H
599 (257H)	Data transmission result	—

(2) Program example



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Appendix 9.6 When clearing received data

The following program example uses the receive data clear request area of the buffer memory.
Refer to Section 6.1.4 for received data clear.

(1) Program conditions

The following program clears the received data in the OS area of the QJ71C24N when the receive clear command (X1025) turns ON.

(a) Devices used:

- Receive clear command X1025
- Receive clear processing execution command..... M10
- Receive clear command pulse signal..... M15
- Receive clear acceptance flag..... M16
- Receive clearing flag..... M17
- Communication disable flag..... M18
- Communication enable flag M19
- Completion check flag..... M20
- Receive clear processing execution status acquisition command..... M21
- Receive clear processing execution status judgment command..... M22
- Completion device for REMFR/REMTO instruction..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction M200, M201
- Receive data clear request area information D0
- Clear request..... D1

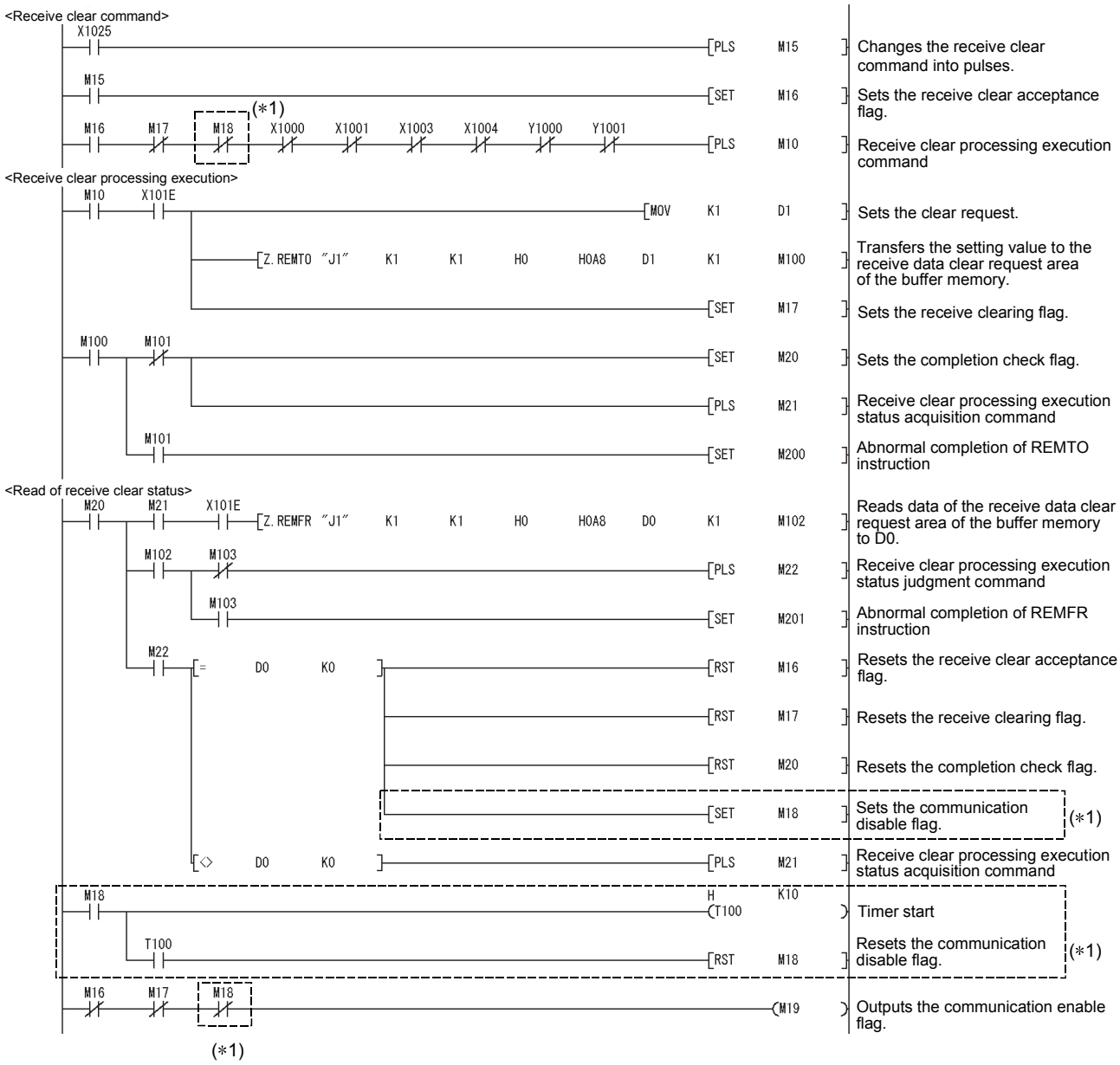
(b) Intelligent function module switch settings (Refer to Section 4.5.2.)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C0H
	b1	OFF		Data bit	7 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol	0006H
Switch 5	—		Station number setting		Station 0	0000H

(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
168 (A8H)	Receive data clear request	0, 1

(2) Program example



*1 When using the Q series C24 of function version A, add the areas enclosed by the dotted lines to the sequence program. (Make communication when M19 is ON.)

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Appendix 9.7 When sending data using user frames

The following program example sends data by the user frames using the REMFR/REMTO instruction and I/O signals.
Refer to the User's Manual (Application) for the transmission using the user frames.

(1) Program conditions

The following program sends data using the user frames from the CH1 side when the transmission signal (X1026) turns ON.

(a) Devices used:

- Transmission command X1026
- Transmission command pulse signal M10
- Transmission user frame designation command M11
- Transmission result acquisition command M12
- Completion device for REMFR/REMTO instruction ..... M100 to 105
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 203
- Normal/abnormal completion of transmission M300, M301
- Transmission data count D0
- Transmission data D1, D2
- CR/LF output designation D5
- Output head pointer designation D6
- Output count designation D7
- Output frame No. designation ..... D8 to D12
- Data transmission result D20

(b) Intelligent function module switch settings (Refer to Section 4.5.2.)

Switch No.	Bit		Description			Setting value
	Position	Designated value				
Switch 1	b0	OFF	Transmission setting	Operation setting	Independent	07C2H
	b1	ON		Data bit	8 bits	
	b2	OFF		Parity bit	No	
	b3	OFF		Even/odd parity	Odd	
	b4	OFF		Stop bit	1 bit	
	b5	OFF		Sum check code	No	
	b6	ON		Write during RUN	Enabled	
	b7	ON		Setting modifications	Enabled	
	b8 to b15	—	Communication rate setting		19200bps	
Switch 2	—		Communication protocol setting		Non-procedure protocol	0006H
Switch 5	—		Station number setting		Station 0	0000H

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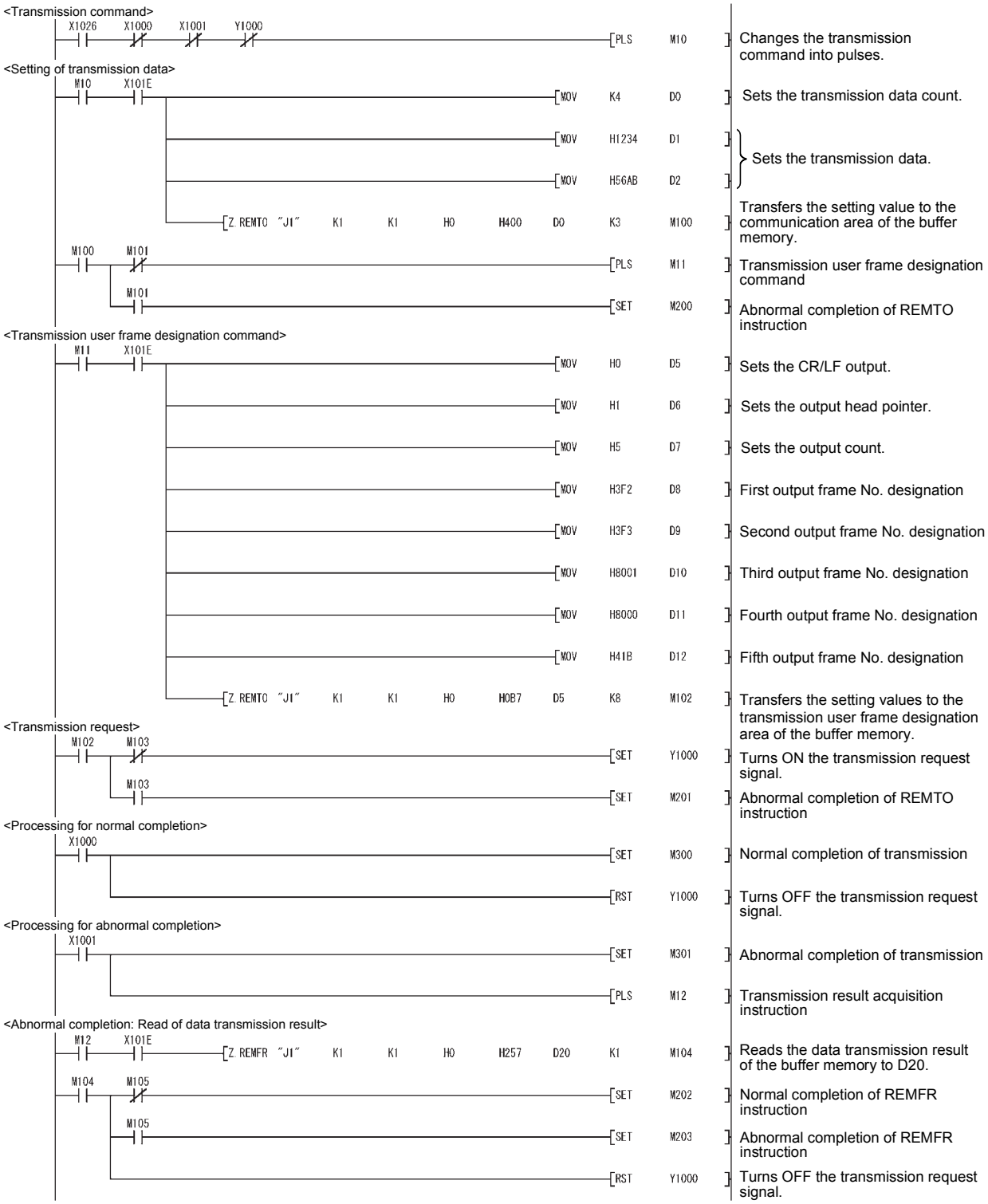
(c) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name		Setting value
150 (96H)	Word/byte units designation		Byte units
162 (A2H)	Transmission buffer memory head address designation		0400H
163 (A3H)	Transmission buffer memory length designation		0200H
183 (B7H)	CR/LF output designation		0
184 (B8H)	Output head pointer designation		1
185 (B9H)	Output count designation		5
186 (BAH)	First output frame No. designation		03F2H
187 (BBH)	Second output frame No. designation		03F3H
188 (BCH)	Third output frame No. designation		8001H
189 (BDH)	Fourth output frame No. designation		8000H
190 (BEH)	Fifth output frame No. designation		041BH
6912 (1B00H)	For registration No. 8001H	Registered data byte count designation	2
6913 (1B01H)		User frame storage	012DH

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(2) Program example

The user frames No. 3F2H, 3F3H, 41BH and 8001H are assumed to have been registered in advance.



Appendix 9.8 When performing initial setting

The following program example performs initial setting using the REMTO instruction. Execute this program when changing the default values of the Q series C24 buffer memory.
Refer to Chapter 8 when changing the default values of the Q series C24 buffer memory using GX Configurator-SC.

(1) Program conditions

The following program performs initial setting on the CH1 side when the initial setting command (X1027) turns ON.

(a) Devices used:

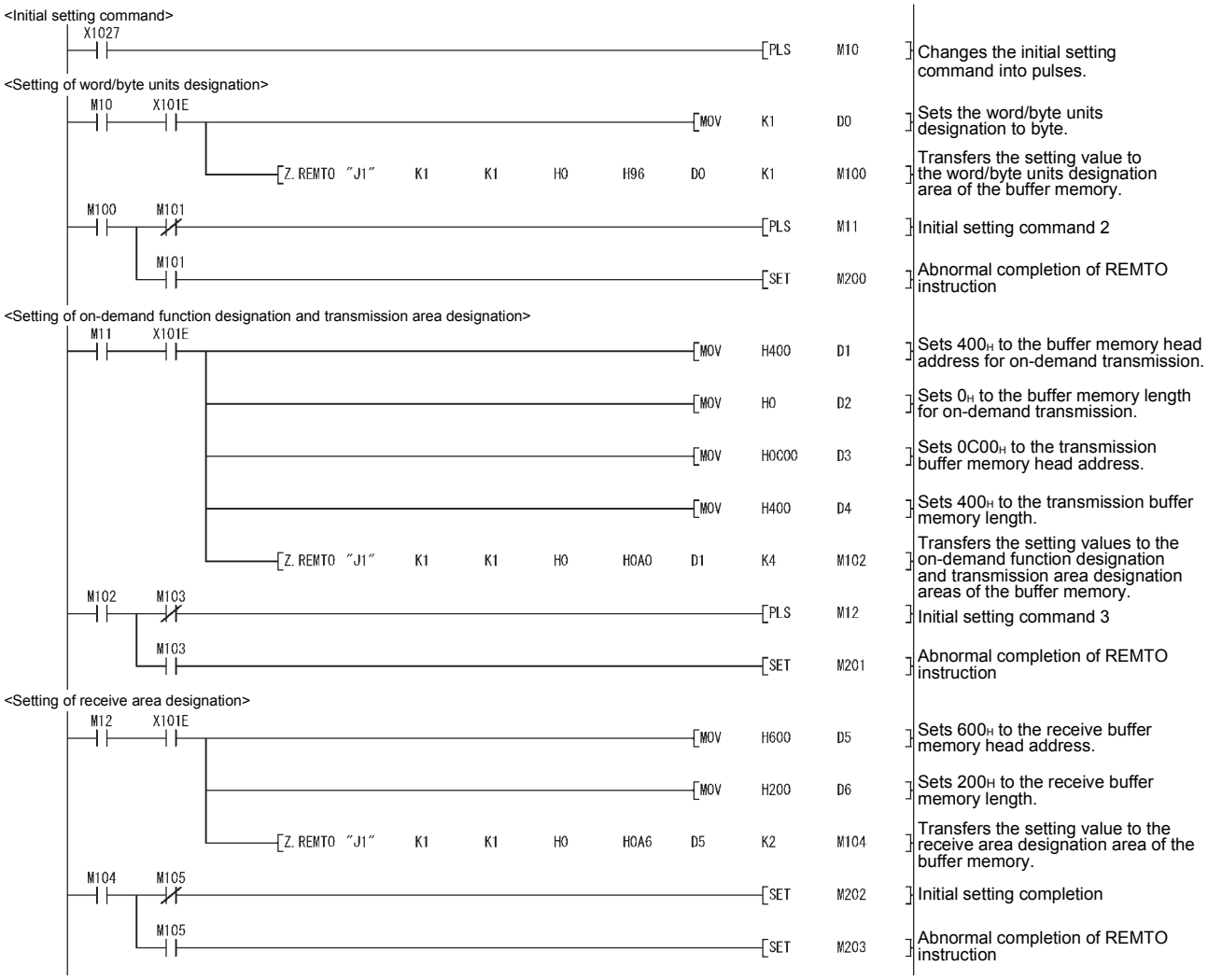
- Initial setting command X1027
- Initial setting command pulse signal..... M10
- Initial setting command 2 ..... M11
- Initial setting command 3 ..... M12
- Completion device for REMTO instruction ..... M100 to 105
- Normal/abnormal completion flag for REMTO instruction ... M200 to 203
- Word/byte units designation..... D0
- Buffer memory head address designation for on-demand function D1
- Buffer memory length designation for on-demand function D2
- Transmission buffer memory head address designation..... D3
- Transmission buffer memory length designation D4
- Receive buffer memory head address designation D5
- Receive buffer memory length designation..... D6

(b) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name	Setting value
150 (96H)	Word/byte units designation	Byte units
160 (A0H)	Buffer memory head address designation for on-demand function designation	0400H
161 (A1H)	Data length designation for on-demand function designation	0000H
162 (B2H)	Transmission buffer memory head address designation	0C00H
163 (A3H)	Transmission buffer memory length designation	0400H
166 (A6H)	Receive buffer memory head address designation	0600H
167 (A7H)	Receive buffer memory length designation	0200H

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(2) Program example



REMARKS

When changing the default values of the following buffer memory areas, refer to above (2) Program example to perform programming.

- DTR/DSR (ER/DR), DC control designation
- DC1/DC3 (Xon/Xoff) code designation
- DC2/DC4 code designation
- CD terminal check designation (for RS-232)
- Communication system designation (for RS-232)
- Simultaneous transmission priority/non-priority designation
- Retransmission time transmission method designation
- Simultaneously transmission data valid/invalid designation
- No-reception monitoring time (timer 0) designation

Appendix 9.9 When registering user frame

The following program example registers a user frame to the flash ROM of the Q series C24 using the REMFR/REMTO instruction and I/O signals.
Refer to the User's Manual (Application) for the registration of the user frame.

POINT
It is recommended to use GX Configurator-SC when registering a user frame to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program registers a user frame to the flash ROM of the QJ71C24N when the registration command (X1028) turns ON.

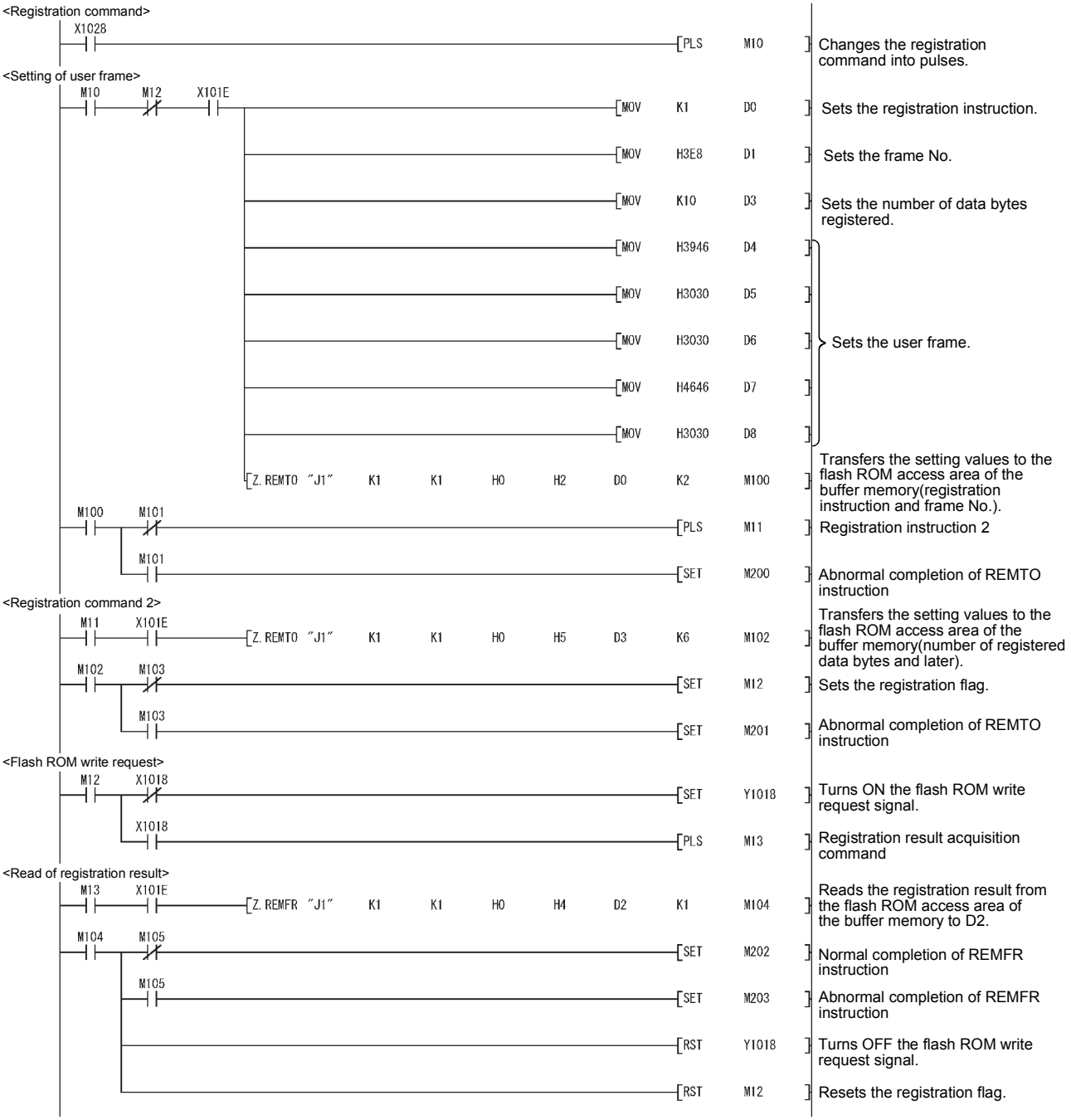
(a) Devices used:

- Registration command X1028
- Registration command pulse signal..... M10
- Registration command 2 ..... M11
- Registration flag..... M12
- Registration result acquisition command..... M13
- Completion device for REMFR/REMTO instruction..... M100 to 105
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 203
- Registration instruction..... D0
- Frame No. D1
- Registration result D2
- Number of data bytes registered D3
- User frame..... D4 to 8

(b) Buffer memory settings used in this example

Address Decimal (Hexadecimal) CH1	Name		Setting value
2 (2H)	For flash ROM access	Register/read/delete instructions	1
3 (3H)		Frame No. direction	03E8H
4 (4H)		Registration/read/delete result storage	—
5 (5H)		Number of data bytes registered designation	10
6 (6H)		User frame	3946H
7 (7H)			3030H
8 (8H)			3030H
9 (9H)			4646H
10 (AH)			3030H

(2) Program example


<Registration command>
X1028
PLS M10
Changes the registration command into pulses.
<Setting of user frame>
M10 M12 X101E
MOV K1 D0
Sets the registration instruction.
MOV H3E8 D1
Sets the frame No.
MOV K10 D3
Sets the number of data bytes registered.
MOV H3946 D4
MOV H3030 D5
MOV H3030 D6
MOV H4646 D7
MOV H3030 D8
Sets the user frame.
Z.REMTO "J1" K1 K1 H0 H2 D0 K2 M100
Transfers the setting values to the flash ROM access area of the buffer memory(registration instruction and frame No.).
M100 M101
PLS M11
Registration instruction 2
M101
SET M200
Abnormal completion of REMTO instruction
<Registration command 2>
M11 X101E
Z.REMTO "J1" K1 K1 H0 H5 D3 K6 M102
Transfers the setting values to the flash ROM access area of the buffer memory(number of registered data bytes and later).
M102 M103
SET M12
Sets the registration flag.
M103
SET M201
Abnormal completion of REMTO instruction
<Flash ROM write request>
M12 X1018
SET Y1018
Turns ON the flash ROM write request signal.
X1018
PLS M13
Registration result acquisition command
<Read of registration result>
M13 X101E
Z.REMFR "J1" K1 K1 H0 H4 D2 K1 M104
Reads the registration result from the flash ROM access area of the buffer memory to D2.
M104 M105
SET M202
Normal completion of REMFR instruction
M105
SET M203
Abnormal completion of REMFR instruction
RST Y1018
Turns OFF the flash ROM write request signal.
RST M12
Resets the registration flag.

Appendix 9.10 When reading user frame

The following program example reads a user frame registered to the flash ROM of the Q series C24 using the REMFR/REMTO instruction and I/O signals.
Refer to the User's Manual (Application) for details.

POINT
It is recommended to use GX Configurator-SC when reading a user frame registered to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program reads a user frame registered to the flash ROM of the QJ71C24N when the read command (X1029) turns ON.

(a) Devices used:

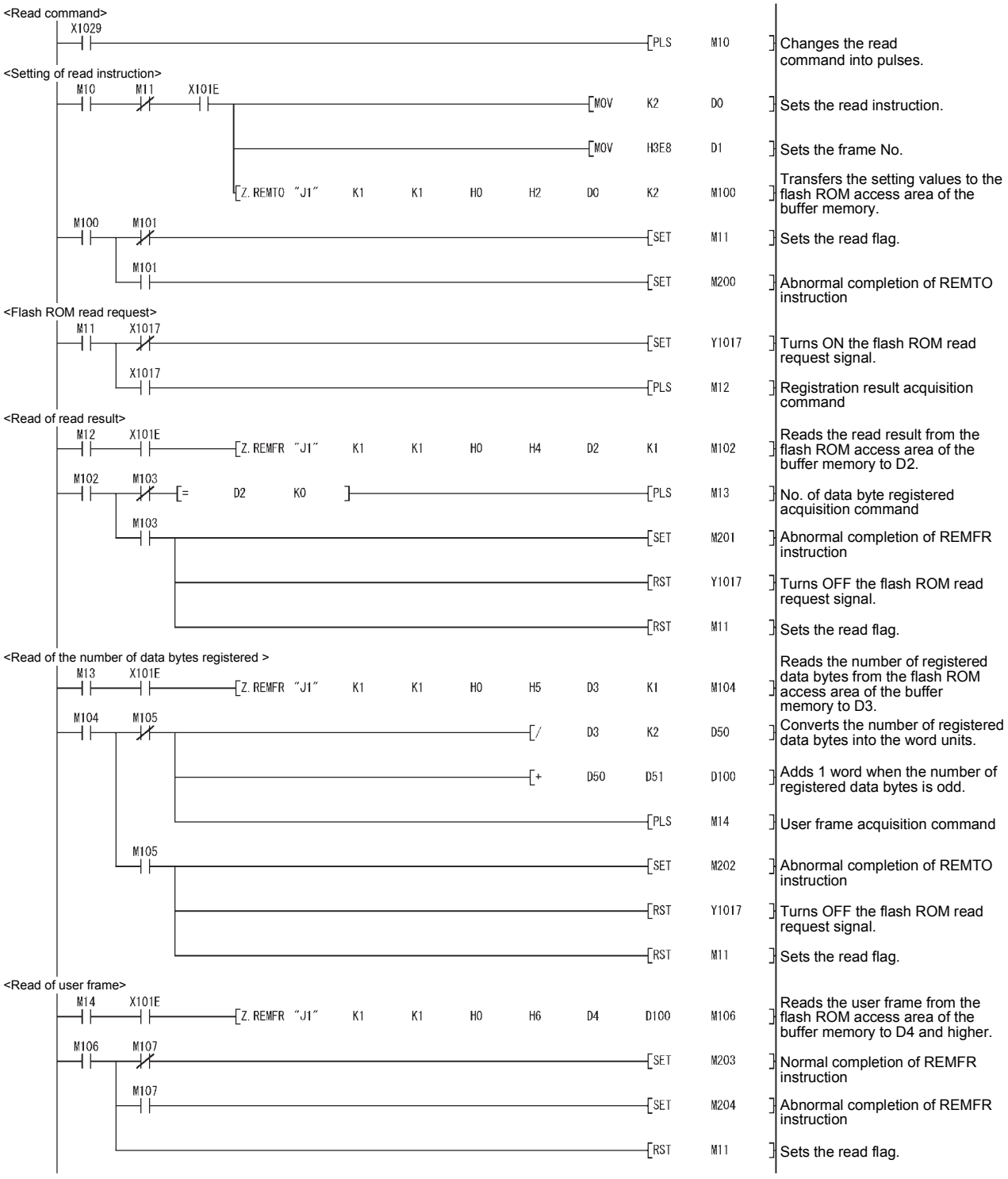
- Read command X1029
- Read command pulse signal M10
- Read flag M11
- Registration result acquisition command..... M12
- Number of data byte registered acquisition command M13
- User frame acquisition command M14
- Completion device for REMFR/REMTO instruction..... M100 to 107
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 204
- Read instruction D0
- Frame No. D1
- Read result D2
- Number of data bytes registered D3
- User frame ..... D4 or later
- Number of registered data D50, D100

(b) Buffer memory settings used in this example

These settings are used to read the user frame registered in Appendix 9.9.

Address Decimal (Hexadecimal) CH1	Name		Setting value
2 (2H)	For flash ROM access	Register/read/delete instructions	2
3 (3H)		Frame No. direction	03E8H
4 (4H)		Registration/read/delete result storage	—
5 (5H)		Number of data bytes registered designation	10
6 (6H)		User frame	—
7 (7H)			—
8 (8H)			—
9 (9H)			—
10 (AH)			—

(2) Program example


<Read command>
X1029
PLS M10
Changes the read command into pulses.
<Setting of read instruction>
M10 M11 X101E
MOV K2 D0
Sets the read instruction.
MOV H3E8 D1
Sets the frame No.
Z.REMTO "J1" K1 K1 H0 H2 D0 K2 M100
Transfers the setting values to the flash ROM access area of the buffer memory.
M100 M101
SET M11
Sets the read flag.
M101
SET M200
Abnormal completion of REMTO instruction
<Flash ROM read request>
M11 X1017
SET Y1017
Turns ON the flash ROM read request signal.
X1017
PLS M12
Registration result acquisition command
<Read of read result>
M12 X101E
Z.REMFR "J1" K1 K1 H0 H4 D2 K1 M102
Reads the read result from the flash ROM access area of the buffer memory to D2.
M102 M103
= D2 K0
PLS M13
No. of data byte registered acquisition command
M103
SET M201
Abnormal completion of REMFR instruction
RST Y1017
Turns OFF the flash ROM read request signal.
RST M11
Sets the read flag.
<Read of the number of data bytes registered >
M13 X101E
Z.REMFR "J1" K1 K1 H0 H5 D3 K1 M104
Reads the number of registered data bytes from the flash ROM access area of the buffer memory to D3.
M104 M105
/ D3 K2 D50
Converts the number of registered data bytes into the word units.
+ D50 D51 D100
Adds 1 word when the number of registered data bytes is odd.
PLS M14
User frame acquisition command
M105
SET M202
Abnormal completion of REMTO instruction
RST Y1017
Turns OFF the flash ROM read request signal.
RST M11
Sets the read flag.
<Read of user frame>
M14 X101E
Z.REMFR "J1" K1 K1 H0 H6 D4 D100 M106
Reads the user frame from the flash ROM access area of the buffer memory to D4 and higher.
M106 M107
SET M203
Normal completion of REMFR instruction
M107
SET M204
Abnormal completion of REMFR instruction
RST M11
Sets the read flag.

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Appendix 9.11 When deleting user frame

The following program example deletes a user frame registered to the flash ROM of the Q series C24 using the REMFR/REMTO instruction and I/O signals.
Refer to the User's Manual (Application) for details.

POINT
It is recommended to use GX Configurator-SC when deleting a user frame registered to the flash ROM of the Q series C24. (Refer to Chapter 8.)

(1) Program conditions

The following program deletes a user frame registered to the flash ROM of the QJ71C24N when the delete command (X1030) turns ON.

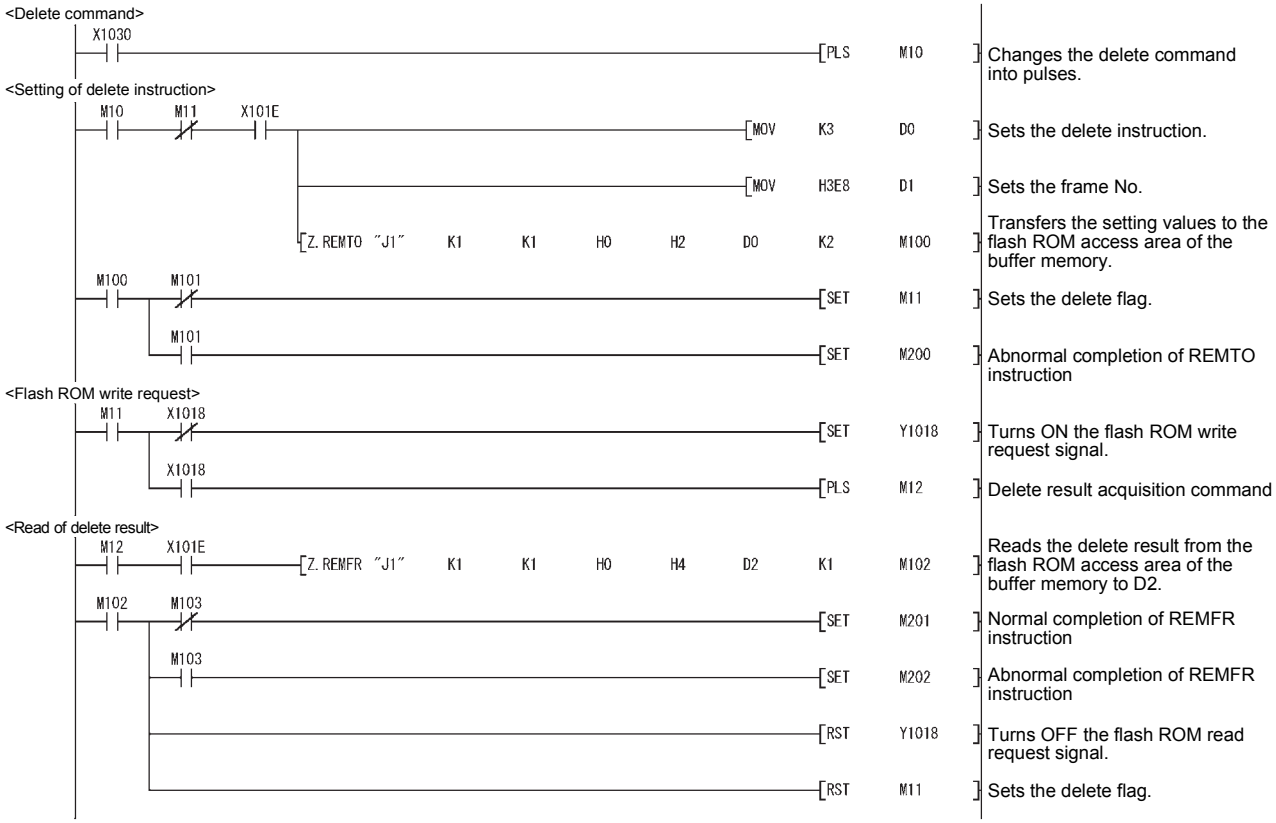
(a) Devices used:

- Delete command X1030
- Delete command pulse signal..... M10
- Delete flag..... M11
- Delete result acquisition command..... M12
- Completion device for REMFR/REMTO instruction..... M100 to 103
- Normal/abnormal completion flag for REMFR/REMTO instruction ..... M200 to 202
- Delete instruction..... D0
- Frame No..... D1
- Delete result D2

(b) Buffer memory settings used in this example
These settings assume that the user frame registered in Appendix 9.9 is deleted.

Address Decimal (Hexadecimal) CH1	Name		Setting value
2 (2H)	For flash ROM access	Register/read/delete instructions	3
3 (3H)		Frame No. direction	03E8H
4 (4H)		Registration/read/delete result storage	—

(2) Program examples



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Appendix 9.12 When changing the communication protocol and transmission setting

This section provides a program example that changes the communication protocol and transmission setting using the REMFR/REMTO instructions and I/O signals. (When the module is used on a MELSECNET/H remote I/O station, the station No. cannot be changed because the UINI instruction is unavailable.)
For changing the communication protocol and transmission setting, refer to the User's Manual (Application).

(1) Program conditions

When the change command (X1031) turns on, the communication protocol and transmission setting are changed.

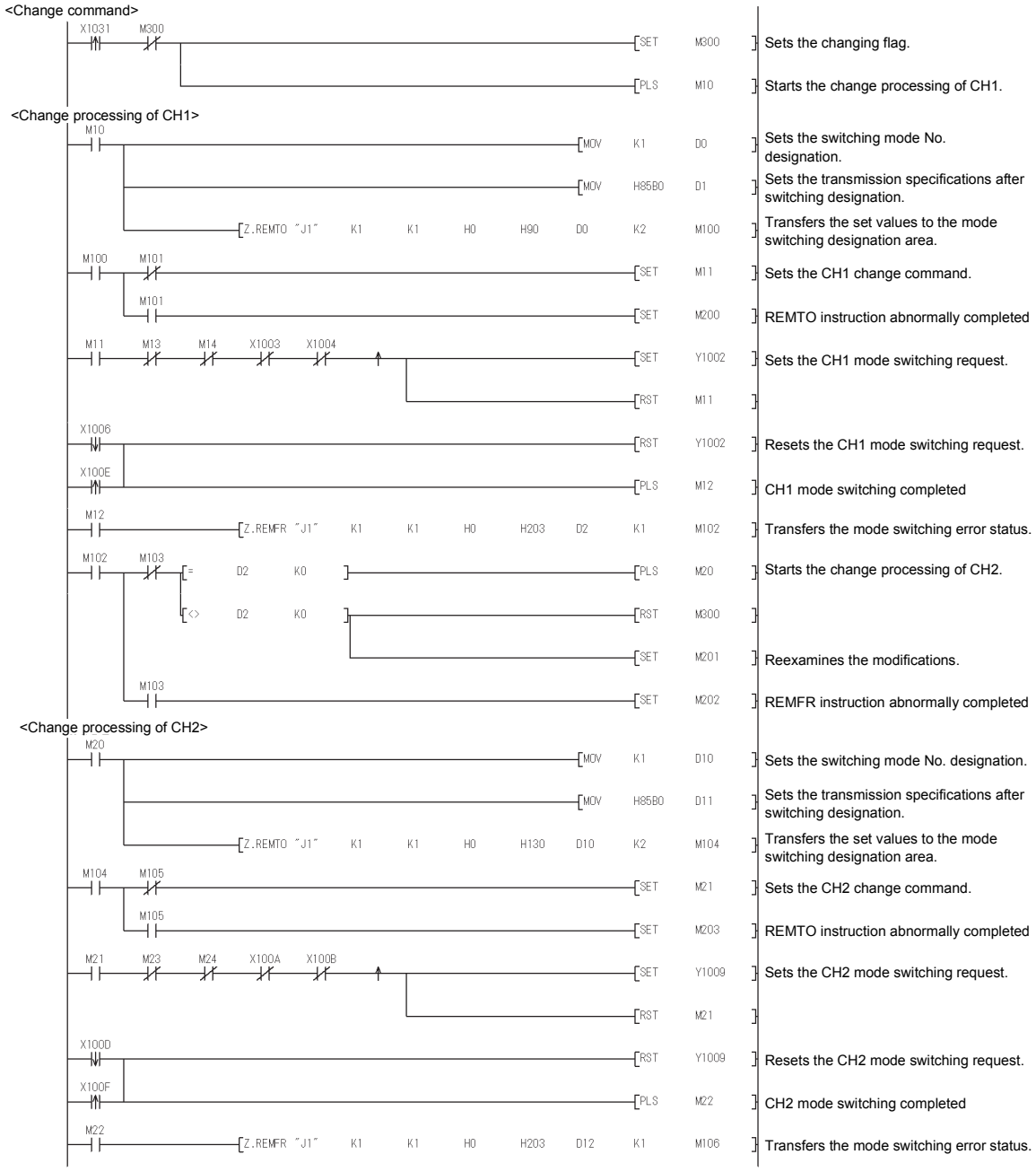
(a) Devices used by user

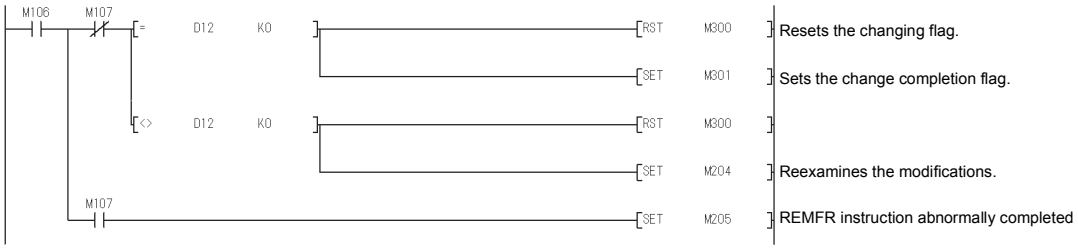
- Change command X1031
- Changing flag M300
- Change completion flag M301
- CH1 change command pulse signal M10
- CH1 change command M11
- CH1 mode switching completion M12
- CH1 receive processing M13
- CH1 send processing M14
- CH2 change command pulse signal M20
- CH2 change command M21
- CH2 mode switching completion M22
- CH2 receive processing M23
- CH2 send processing M24
- REMFR/REMTO instruction completion device ..... M100 to 107
- REMFR/REMTO instruction abnormal completion flag ..... M200 to 205
- Switching mode No. designation D0, D10
- Transmission specifications after switching designation D1, D11
- Switch setting error and mode switching error status D2, D12

(b) Buffer memory settings used in this example

<table>
<tr><th colspan="2">Address, Decimal (Hexadecimal)</th><th colspan="2">Bit</th><th colspan="3" rowspan="2">Description</th><th rowspan="2">Set value</th></tr>
<tr><th>CH1</th><th>CH2</th><th>Position</th><th>Specified value</th></tr>
<tr><td>114 (90H)</td><td>304 (130H)</td><td colspan="2">—</td><td colspan="2">Switching mode No. designation</td><td>MC protocol (Format 1)</td><td>0001H</td></tr>
<tr><td rowspan="11">145 (91 H)</td><td rowspan="11">305 (131H)</td><td>b0</td><td>OFF</td><td rowspan="11">Transmission specifications after switching designation</td><td>Operation setting</td><td>Independent</td><td rowspan="11">85B0H</td></tr>
<tr><td>b1</td><td>OFF</td><td>Data bit</td><td>7 bits</td></tr>
<tr><td>b2</td><td>OFF</td><td>Parity bit</td><td>No</td></tr>
<tr><td>b3</td><td>OFF</td><td>Even/odd parity</td><td>Odd</td></tr>
<tr><td>b4</td><td>ON</td><td>Stop bit</td><td>2 bits</td></tr>
<tr><td>b5</td><td>ON</td><td>Sum check code</td><td>Yes</td></tr>
<tr><td>b6</td><td>OFF</td><td>Write during RUN</td><td>Prohibited</td></tr>
<tr><td>b7</td><td>ON</td><td>Setting modifications</td><td>Allowed</td></tr>
<tr><td>b8 to b11</td><td>—</td><td>Communication rate setting</td><td>9600bps</td></tr>
<tr><td>B12 to 14</td><td>All OFF</td><td>For system</td><td>—</td></tr>
<tr><td>B15</td><td>ON</td><td>Transmission specifications after switching designation</td><td>Make setting as set in this area.</td></tr>
<tr><td colspan="2">515 (203H)</td><td colspan="2">—</td><td colspan="3">Switch setting error and mode switching error status</td><td>—</td></tr>
</table>

(2) Program examples




M106
M107
=
D12
K0
RST
M300
Resets the changing flag.
SET
M301
Sets the change completion flag.
<>
D12
K0
RST
M300
SET
M204
Reexamines the modifications.
M107
SET
M205
REMFR instruction abnormally completed

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Appendix 10 Setting Value Recording Sheet

The following sheet is for recording parameter setting values set by GX Developer. Use as many copies as needed.

* In order to review the setting values of the utility package (GX Configurator-SC), print out the content of the file generated by the "Make text file" function of GX Configurator-SC which can be used as the setting value recording sheet.

[Module No.]

Recording sheet 1 (Intelligent function module interrupt pointer setting)

GX Developer setting screen	Data item name		Set data	
			Setting value	Remarks
Intelligent function module interrupt pointer setting	CPU side	Interrupt pointer start No.		Input format: Decimal
		Interrupt pointer No. of modules	2 (fixed)	
	Intelligent module side	Start I/O number		Input format: Hexadecimal
		Start SI number	0 (fixed)	Input format: Decimal

Recording sheet 2 (Remote password setting)

GX Developer setting screen	Data item name		Set data	
			Setting value	Remarks
Remote password settings	Password settings	Password		Input format: Character strings
	Password active module settings	Model name	QJ71C24/CMO	Input format: Selection
		Start XY		Input format: Hexadecimal

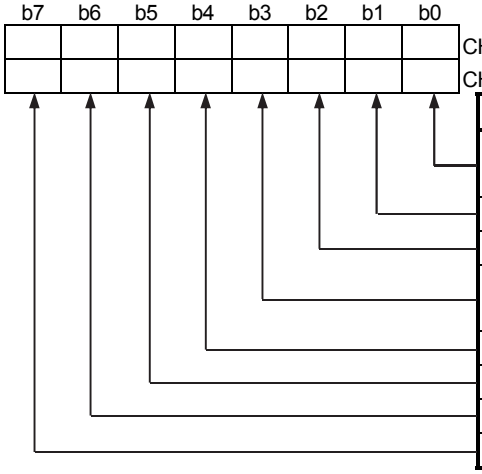
Recording sheet 3 (Intelligent function module switch setting)

Switch number	Description															
Switch 1	CH1 Communication rate setting								CH1 Transmission setting							
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	H															
Switch 2	CH1 Communication protocol setting =															
Switch 3	CH2 Communication rate setting								CH2 Transmission setting							
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	H															
Switch 4	CH2 Communication protocol setting =															
Switch 5	Station number setting =															

* Check the setting values in the next page and record them.

(GX Developer "Intelligent function module switch setting" setting values recording check sheet)

(1) Transmission setting (Enter "0" or "1" in the bit position field.)



Bit	Description	OFF (0)	ON (1)	Remarks
b0	Operation setting	Independent	Linked	Always set to OFF on CH1 side.
b1	Data bit	7	8	Do not include parity bit.
b2	Parity bit	No	Yes	Vertical parity
b3	Odd/even parity	Odd	Even	Valid only when parity bit is set to Yes.
b4	Stop bit	1	2	—
b5	Sum check code	No	Yes	—
b6	Write during RUN	Prohibit	Allow	—
b7	Setting modification	Prohibit	Allow	—

(2) Communication rate setting (Enter check marks in the CH1 and CH2 fields.)

CH1	CH2	Setting value	Communication speed (unit: bps)
		F_H	50
		0_H	300
		1_H	600
		2_H	1200
		3_H	2400
		4_H	4800
		5_H	9600
		6_H	14400
		7_H	19200
		8_H	28800
		9_H	38400
		A_H	57600
		B_H	115200
	—	C_H	230400

(3) Communication protocol setting (Enter check marks in the CH1 and CH2 fields.)

CH1	CH2	Setting value	Setting data	
		0_H	GX Developer connection	
		1_H	MC protocol	Format 1
		2_H		Format 2
		3_H		Format 3
		4_H		Format 4
		5_H		Format 5
		6_H	Non procedure protocol	
		7_H	Bidirectional protocol	
		8_H	For linked operation setting	
		9_H to D_H	Setting prohibited	
		E_H	ROM/RAM/Switch test	
		F_H	Individual station recovery test	

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SH(NA)-080006-R(1503)MEE
MODEL: QJ71C24-U-KI-E
MODEL CODE: 13JL86

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